Site Selection Process
Phase 4A: Selection of A Preferred Site(s)

Social Analysis Appendices

Volume 3

Visual Impact Assessment

Prepared For:

The Institute of Environmental Research

Submitted By

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Ref. No. T543-1
January 10, 1986.

Mr. Peter Homenuck
Institute of Environmental Research Inc.
81 Sheppard Avenue West
Suite 201
Willowdale, Ontario
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Dear Mr. Homenuck

Re: VISUAL IMPACT ASSESSMENT
OF THE CANDIDATE SITING OPTIONS
Ontario Waste Management Corporation

We are pleased to submit our report for the above study. In accordance with our terms of reference, this assessment is an overview document which identified, in relative terms, the anticipated visual impacts of the proposed facilities and ranks the candidate siting options in order of preference.

Further, more detailed assessments should be undertaken when the preferred siting option is identified, based on these and the other criteria. We look forward to reviewing the findings with you and trust they will make a contribution to the overall site identification process.

Yours truly,
E.D.A. Collaborative Inc.

Bruce Cudmore
Principal

TABLE OF CONTENTS

PAGE

EXECUTIVE SUMMARY i - xiii

SECTION A: INTRODUCTION

- Background to the Study 1
- Purpose of this Report 1
- Study Process 3
- Relationship of Visual Impact Study to Other 4A Studies 4
- Visual Terminology 6

SECTION B: PRELIMINARY INVESTIGATIONS

- Introduction 20
- Facility Character Assumptions 20
- Siting Options 23
- Site Character Descriptions 29

SECTION C: ANALYSIS

- Introduction 46
- Analysis Description
  - Site Exposure 46
  - Special Visual Exposure 56
  - Visual Absorption Potential 60
  - Visual Compatibility 65
  - Intrusion on Passing Traffic (Dynamic Viewer) 75
  - Intrusion on Surrounding Households (Resident Viewer) 85
- Mitigative Recommendations 102
- Mitigative Priorities 105
- Summary of Findings 123

SECTION D: COMPARATIVE EVALUATION OF SITING OPTIONS

- Introduction 130
- Comparison of Findings 130
- Overall Ranking of Siting Options 130
- Recommendations 131

BIBLIOGRAPHY 133

LIST OF TABLES

PAGE

SECTION B

. Table 1 Area of Site Open Space vs. Mature Woodlot 43

SECTION C

. Table 2 Summary of Site Visual Exposure from Ground Level 48

. Table 3 Special Visual Exposure Factors - Elevation and Distance 59

. Table 4 Screening Potential of Existing Vegetation 63

. Table 5 Aggregate Screening Potential for Cases 2 and 3 64

. Table 6 Area Land Use Building Types and Development Patterns 67

. Table 7 Traffic Volumes for Each Site 76

. Table 8 Traffic Volumes for Siting Options 77

. Table 9 Number of Households Exposed to View (by site and case) 87

. Table 10 Composite Number of Households Exposed to View (by siting option) 88

. Table 11 Length of Site Boundary Requiring Visual Screening (by site and case) 103

. Table 12 Length of Site Boundary Requiring Visual Screening for Each Siting Option 103

. Table 13 Length of High and Medium Priority Zone Boundaries (by site and case) 107

. Table 14 Total Length of High and Medium Priority Zone Boundaries (by siting option) 108

. Table 15 Priorities for Visual Mitigation 109

SECTION D

. Table 16 Summary of Visual Impact Assessment Rankings 131

LIST OF FIGURES

PAGE

SECTION A

- Figure 1 Location of Candidate Sites 2
- Figure 2 Field of Vision at Varying Distance 17
- Figure 3 Visual Characteristics at Varying Distances 18

SECTION B

Plant Layouts

- Figure 4 Case 1 24
- Figure 5 Case 1 25
- Figure 6 Case 2 26
- Figure 7 Case 3 27
- Figure 8 Case 3 28

Existing Open Space

- Figure 9 LF-4N 30
- Figure 10 PI-1N 32
- Figure 11 PI-13N 34
- Figure 12 LF-3C 36
- Figure 13 LF-9C 38
- Figure 14 LF-1E 40
- Figure 15 PI-27E 42

SECTION C

Visual Exposure (General) of Site from Selected Viewpoints

- Figure 16 LF-4N 49
- Figure 17 PI-1N 50
- Figure 18 PI-13N 51

LIST OF FIGURES

PAGE

SECTION C

Visual Exposure (General) of Site from Selected Viewpoints (continued)

. Figure 19 LF-3C 52

. Figure 20 LF-9C 53

. Figure 21 LF-1E 54

. Figure 22 PI-27E 55

Visual Exposure (Special) of Site from Special Vantage Points

. Figure 23 57

. Figure 24 57

. Figure 25 58

Visual Compatibility and Land Use

. Figure 26 LF-4N 68

. Figure 27 PI-1N 69

. Figure 28 PI-13N 70

. Figure 29 LF-3C 71

. Figure 30 LF-9C 72

. Figure 31 LF-1E 73

. Figure 32 PI-27E 74

Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

. Figure 33 LF-4N 78

. Figure 34 PI-1N 79

. Figure 35 PI-13N 80

. Figure 36 LF-3C 81

. Figure 37 LF-9C 82

. Figure 38 LF-1E 83

. Figure 39 PI-27E 84

LIST OF FIGURES

PAGE

SECTION C

Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

- Figure 40 LF-4N case 2 89
- Figure 41 LF-4N case 3 90
- Figure 42 PI-1N case 2 91
- Figure 43 PI-1N case 3 92
- Figure 44 PI-13N case 2 93
- Figure 45 PI-13N case 3 94
- Figure 46 LF-3C case 1 95
- Figure 47 LF-9C case 1 96
- Figure 48 LF-1E case 1 97
- Figure 49 LF-1E case 2 98
- Figure 50 LF-1E case 3 99
- Figure 51 PI-27E case 2 100
- Figure 52 PI-27E case 3 101

Proposed Mitigative Priority Zones

- Figure 53 LF-4N case 2 110
- Figure 54 LF-4N case 3 111
- Figure 55 PI-1N case 3 112
- Figure 56 PI-1N case 2 113
- Figure 57 PI-13N case 3 114
- Figure 58 PI-13N case 2 115
- Figure 59 LF-3C case 1 116
- Figure 60 LF-9C case 1 117
- Figure 61 LF-1E case 1 118
- Figure 62 LF-1E case 2 119
- Figure 63 LF-1E case 3 120
- Figure 64 PI-27E case 2 121
- Figure 65 PI-27E case 3 122

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

1. PURPOSE OF THE REPORT

The purpose of this report is to document the study carried out on aspects of visual impact associated with the eight sites selected by the Ontario Waste Management Corporation candidate for the location of a special waste treatment and disposal facility. As part of the socio-economic impact analysis, the Corporation wished to have an overview of the extent to which there is visual impact at each site and what general steps might be taken in mitigation. The term, **visual impact** refers to the degree of change in a particular view. The specific objectives to be achieved in the study were:

1. An overview of the extent of visual impact at each of the eight (8) candidate sites[1] through the construction of one or more specific special waste treatment and/or disposal facility components;
2. Identification of appropriate and effective general mitigative measures which can be utilized to minimize these potential visual impacts;
3. Identification of factors and indicators which can be used to measure, in general terms, the potential level of visual impact at each site, and finally;
4. Definition and application of a procedure for ranking the siting options in order of preference.

2. SCOPE AND METHOD

In order to address the purpose and objectives of the study, a study process was identified that would provide comparative, factual data where possible that could be used to predict visual impact. Given that sight and vision are primary human senses, values and judgements would also be involved in the evaluation.

The approach taken to accomplish this task included the following four steps:

1. Site and Facility Familiarization
2. Pre-Mitigation and Post-Mitigation Analysis

---

[1] Site LF-2N was dropped from consideration part way through Phase 4A because it failed to provide natural containment. Partially integrated siting options PI-1N/LF-2N and PI-13N/LF-2N, therefore were also dropped from consideration. Refer to M.M. Dillon Ltd., Site Selection Process, Phase 4A: Interim Site Selection Report Candidate Site LF-2N, 1985, for details of this decision.

3. Definition of Factors and Indicators

4. Comparative Evaluation of Siting Options

The analysis undertaken in this study utilized graphic documentation, photography, personal observation of the sites and graphic overlay analysis techniques.

The approach and techniques used were adequate for comparative evaluation purposes.

The analyses undertaken during this assessment were based on two general areas of concern:

- Impacts on local environs and residents
- Impacts on region and nonresidents

The analyses used to investigate impacts on the local environs and residents included:

- Visual absorption
- Visual compatibility
- Intrusion on surrounding households

The analyses used to investigate impacts on the region and nonresidents included:

- Special site exposure
  (from designated viewing points)
- Intrusion on passing traffic

Each of these analyses were carried out, in the absence of mitigative measures, at an overview level, sufficient to produce relative comparisons.

The following set of analyses were carried out with appropriate mitigative measures at an overview level to produce relative comparisons:

- Mitigative recommendations
- Mitigative priorities

Each of the siting options were assigned relative scores based on the findings of these analyses and totalled for pre- and post-mitigation assessments.

3. PREMISES AND POSTULATES

In order to assess visual impacts of proposed facilities at specific sites, assumptions were made regarding the type and extent of development at each site.

Premises

The Consultants were provided with the following information from OWMC and other site selection consultants:

1. The location and acquisition zone boundaries of the eight candidate sites.

2. The proposed facility type and various combinations of facility types possible on each site. (Referred to as Cases 1,2 and 3)

   Case 1 refers to a fully integrated siting option where all facilities are located on one site. Cases 2 and 3 refer to partially integrated siting options where the incinerator and phys/chem plant (Case 2) or the phys/chem plant and landfill (Case 3) are located on one site; and the landfill (Case 2) or the incinerator (Case 3) is located on a separate site. These combinations are discussed more fully in the main body of the report.

3. The location and configuration of the proposed facility cn each site.

4. The dimensions and visual characteristics of each facility type.

5. A minimum buffer zone or setback defined around each facility type within the acquisition zone boundary.

6. Houses within the acquisition zone would not remain.

7. Major woodlots located within the buffer zone or setback in the site acquisition area depending on the case were to remain and would provide visual screening.

8. Major woodlots located in the facility development zone of the site acquisition areawere to be removed during construction and would not provide visual screening.

9. Major wooded areas located on adjacent lands were to remain and would provide visual screening.

Postulates

The following assumptions were made by the visual consultant during the development and application of the impact assessment:

1. Households and community features located outside the site acquisition boundary would not be displaced in the event of facility development

2. visual impacts would be greatest close to the facility where unobstructed views are possible and would dissipate over distance.

3. where commitments to the application of mitigative measures were made, they were incorporated in the analysis.

4. STATUS OF DATA

Visual Impact Assessment is not a finite science. However, this study attempted to use data and quantitative analysis techniques as much as possible to compare siting options. Some qualitative interpretations were also employed to explore the fit between the facility and the surrounding landscape.

The type of data used in the analyses for this study included the following:

- Data were mapped at 1:10000 scale for each site. Sufficient data were present at this scale to allow relative ranking. These data maps were reduced to approximately 1:30000 scale for use in this report.

- In addition, 1:50000 scale mapping was also used for regional context and special exposure analysis.

- Existing land use data were provided by Leon Kentridge Associates.

- Photography was carried out in colour slide and black and white print formats. These photographs are representative of certain seasonal, time of day and environmental conditions which are variable. Data collected are considered reasonably representative of the average conditions.

- Household data were provided by Leon Kentridge Associates. The accurate household count data were carried out only within a 2.0 km. distance from the sites. Beyond this distance (2.0 to 5.0 km) only census data are available. Because of this, no household locations could be plotted and consequently are not used in the analysis.

- Traffic data were derived from the Ministry of Transportation and Communications, 1983 Traffic Volumes statistics for major and secondary highways and tertiary roads. Regional road traffic volumes were provided by M.M. Dillon.

5. MAIN FINDINGS

Each of the indicators of this analysis contributed to an overall understanding of the anticipated visual impacts for each siting option. The final product of this investigation was an overall ranking of the siting options in order of preference both before and after mitigation.

It should be noted here that it was assumed that exposure to the facility would result in some level of visual impact. The significance of these impacts relates very much to community values. Local impacts are given greater weight than regional and nonresident impacts since these would be felt at all times to a greater or lesser extent. This assessment has identified some of the key changes that would result in the visual landscape and these findings are integrated into the overall social impact assessment in relation to community values.

The following analysis findings summarize the ranking of the siting options for each of the indicators.

Site Analysis Findings

Each of the analysis investigations were undertaken without mitigative measures, with the following results:

- **Visual exposure** The area of each site which is exposed to views from surrounding corners was calculated based on each site's inherent visual screening attributes. The results of this assessment are:

Least exposed	1.	PI-27E
	2.	LF-1E
	3.	LF-3C
	4.	LF-4N
	5.	PI-13N and PI-1N
Most exposed	6.	LF-9C

Although ranked in numerical order, it should be noted that PI-27E had an average of less than 20% visual exposure and sites LF-1E and LF-3C were roughly 30% exposed to view.

On the far end of the scale, site LF-4N was over 50% exposed to view while PI-13N, PI-1N and LF-9C were closely ranked at approximately 70% exposure.

This first assessment did not attempt to predict impact, but is a measure of each site's degree of openness, as seen from selected, groundlevel viewing points. This analysis indicator was not used in the overall ranking of siting options since it did not take the changes due to the facility into account. It only provided a base of existing conditions for each site.

- **Special visual exposures** Each site was then evaluated as to whether it was within view of one or more particular, unique viewing opportunities. The following sites have special visual exposures:

  - PI-27E and LF-1E from the Skylon and Minolta Towers in Niagara Falls; but in background, non-primary viewsheds with other industrial and commercial images nearby. These sites were identified as visible but not of great significance in the view.

  - LF-4N, PI-1N and PI-13N from the Rattlesnake Point and Mount Nemo on the Niagara Escarpment within the primary scope of view set in middleground and background areas.

  - Sites LF-9C and LF-3C were not visible from any special or unique viewing points and were therefore clearly ranked least exposed to designated viewing points .

  The height of the viewing point and the distance were measured as well as whether the sites were within the primary scope of view to determine their relative vulnerability to this factor. The findings of this assessment are as follows:

Rank		Siting Option	Case
Least exposed	1	LF-9C	1
		LF-3C	1
	2	LF-1E	1
	3	LF-1E and PI-27E	2 and 3
Most exposed	4	LF-4N and PI-13N	2 and 3
	5	LF-4N and PI-1N	2 and 3

- **Visual absorption.** The length of each site boundary that would be screened by existing vegetative masses was measured and calculated as a percentage of the total length of boundary. This figure was used as the method of ranking the effectiveness of the existing landscape to "absorb" the proposed facility. The results of this investigation are summarized as follows:

	Rank	Siting Option	Case
Maximum absorption potential	1	LF-1E and PI-27E	2 and 3
	2	LF-1E	1
	3	LF-3C	1
	4	LF-9C	1
	5	LF-4N and PI-1N	3
	6	LF-4N and PI-1N	2
	7	LF-4N and PI-13N	3
Minimum absorption potential	8	LF-4N and PI-13N	2

Siting options LF-1E/PI-27E and LF-1E were closely ranked each having approximately 50% of their site boundaries visually screened by existing vegetation. Siting option LF-3C had less than 20% screening intact and LF-9C with just less than 15% of the boundary screened. LF-4N and PI-1N each had approximately 10%. PI-13N had less than 5% of its boundary screened. This resulted in the lower ranks by the siting options involved with these sites.

- **Visual compatibility** Surrounding land uses were identified for each site, as well as the existing building types and level of human activity patterns. Visual character factors such as scale and landscape were part of this assessment of each site.

The proposed facility was considered least visually compatible with non-industrial land uses such as residential, recreational and commercial uses; whereas it was considered more visually-compatible with heavy industrial uses. The facility was also considered not visually compatible with predominantly rural and open space land uses.

The following ranking indicates the degree of visual compatibility of the proposed facility which can be seen from surrounding land uses.

	Rank	Siting Option	Case
Most visually compatible	1	LF-1E	1
	2	LF-1E and PI-27E	2 and 3
	3	LF-3C	1
	4	LF-9C	1
Least visually compatible	5	LF-4N and PI-13N	2 and 3
	6	LF-4N and PI-1N	2 and 3

This analysis identified sites LF-1E and PI-27E as being located in rural areas but with other industrial and heavy industrial areas nearby and were designated as most compatible. Sites LF-4N, PI-1N and PI-13N, are located in rural areas within view of the Niagara Escarpment. Sites LF-3C and LF-9C are also in rural areas and less visually compatible than the Niagara Falls sites, but only somewhat more compatible than the Milton sites since no other unique feature was present within the viewsheds.

- **Intrusion on passing traffic (Dynamic Viewer)** Traffic counts were obtained for all roads within the viewshed boundary including primary and secondary highways as well as tertiary roads. Since passing traffic is of a dynamic nature, it was assumed that even though portions of some sites were buffered to varying degrees, the traffic would have some view to the proposed facility. For this reason, roadway traffic counts have been used for this assessment. The results of this assessment ranked the siting options as follows:

	Rank	Siting Option	Case
Least amount of intrusion	1	LF-3C	1
	2	LF-9C	1
	3	LF-1E	1
	4	LF-1E and PI-27E	2 and 3
	5	LF-4N and PI-1N	2 and 3
Greatest amount of intrusion	6	LF-4N and PI-13N	2 and 3

The integrated sites rank best in this assessment. Site LF-3C is by far the site least intrusive on passing traffic, with an average of less than 1000 vehicle trips per day. Site LF-9C ranked second, but was exposed to over 8000 vehicle trips per day and LF-1E was exposed to about 27000 vehicle trips per day.

Partially integrated sites were exposed to a minimum of twice as many vehicle trips as site LF-1E due to the combining of traffic figures for both sites.

- **Intrusion on surrounding households (Resident Viewer)** The number of households that would be exposed to potential views to the facilities from the foreground (0-0.8km.) and the middleground (0.8-5.0km.) were identified. These households were identified through the projection of view sheds into the surrounding landscape by taking into account the proposed facility location and the location of existing major tree masses and significant landforms. The households were then totalled within the exposed foreground and middleground areas for each site.

Household counts and specific locations were available only within 2.0 km of each site. Beyond this distance, only general census data was available. Therefore only actual households that could be plotted were included in this analysis.

This assessment resulted in the following ranking:

	Rank	Siting Option	Case
Least	1	LF-1E	1
intrusion	2	LF-1E and PI-27E	2 and 3
	3	LF-3C	1
	4	LF-9C	1
Most	5	LF-4N and PI-1N	2 and 3
intrusion	6	LF-4N and PI-13N	2 and 3

Siting options LF-1E and LF-1E/PI-27E were very closely ranked with LF-1E having six fewer exposed households. Siting option LF-3C was also closely ranked slightly lower than LF-1E/PI-27E. Siting option LF-9C was ranked lower again. All these siting options had less than 80 exposed households each.

Siting options LF-4N/PI-1N and LF-4N/PI-13N had substantially more exposed households than any of the others (approximately 175 each).

The background areas were not included, since in many cases it was not known which households in that extensive area were exposed and which were not. In addition, it is generally accepted that the more significant intrusion takes place in the foreground and middleground areas as opposed to the background.

Overall Ranking of Siting-Options (Pre-mitigation) The following composite rankings were produced by totalling individual rankings on the analysis previously carried out. Inherently in this ranking system, greater weight is given to impacts on local residents and the adjacent area as opposed to the regional and nonresident impacts since there are more indicators for this factor grouping.

Rank	Siting Option	Case
1	LF-1E	1
2	LF-3C	1
3	LF-1E and PI-27E	2 and 3
4	LF-9C	1
5	LF-4N and PI-1N	3
6	LF-4N and PI-1N	2
7	LF-4N and PI-13N	3
8	LF-4N and PI-13N	2

It should be noted that based on the individual indicators which comprise this composite ranking the first four siting options, as a group, rank well ahead of the last four siting options.

Visual Analysis Findings (with mitigation)
Each of the investigations below were then undertaken to identify the implications of applying mitigative techniques to each site/facility variation. Prior to applying the mitigative techniques, a series of appropriate mitigative measures were identified.

- **Mitigative recommendations.** This analysis involved the calculation of the length of site boundaries requiring mitigation (screening) for each site. The amount of existing vegetation which would potentially be preserved was taken into account in this analysis depending on the case. The site ranking based on the amount of required mitigation is summarized below:

	Rank	Siting Options	Case
Least visual screening required	1	LF-1E	1
	2	LF-9C	1
	3	LF-3C	1
	4	LF-1E and PI-27E	2 and 3
	5	LF-4N and PI-1N	2
Most visual screening required	6	LF-4N and PI-13N	2
	7	LF-4N and PI-1N/ LF-4N and PI-13N	3/ 3

Siting option LF-1E ranked well above option LF-9C which in turn ranked well above options LF-3C and LF-1E/PI-27E which were closely ranked.

The other partially integrated sites had much more extensive visual screening requirements. This assessment clearly found the fully integrated sites to be preferable, since only one site had to be treated.

- **Mitigative priorities** Although actual costs for mitigation measures cannot be calculated at this time, the relative costs for implementation of effective mitigation measures were defined. Factors considered here were the amount and priority of the mitigation required and a theoretical cost factor for high, medium and low priority areas. It was assumed that high priority areas would require greater screening efforts and hence greater cost than medium or low priority areas. Levels of priority were identified based on numbers of potential viewers (households and traffic) along any given boundary.

	Rank	Siting Option	Case
Least amount of mitigative priorities	1	LF-1E	1
	2	LF-9C	1
	3	LF-3C	1
	4	LF-1E and PI-27E	2 and 3
	5	LF-4N and PI-1N	2
Greatest amount mitigative priorities	6	LF-4N and PI-13N	2
	7	LF-4N and PI-1N	3
		LF-4N and PI-13N	3

The results of this assessment reinforced the findings of the previous assessment. Once again, the fully integrated sites were generally preferable to the partially integrated sites.

Overall Ranking of Siting Options (with mitigation)

Taking the results of the mitigative analysis into consideration, the following ranking of siting options was identified:

Rank	Siting Option	Case
1	LF-1E	1
2	LF-3C	1
3	LF-9C	1
4	LF-1E and PI-27E	2 and 3
5	LF-4N and PI-1N	2
6	LF-4N and PI-1N	3
7	LF-4N and PI-13N	2
8	LF-4N and PI-13N	3

6. CONCLUSIONS AND RECOMMENDATIONS

The eight candidate siting options and their corresponding case types create potential visual impacts on the surrounding area. The extent to which the facility would have visual impact has been measured.

Characteristics which identify a siting option and case as having least visual impact are as follows:

- No exposure to special viewing locations.
- Large amount of existing screening that would maximize "visual absorption".
- Surrounding land uses which have existing or future industrial or heavy industrial uses and similar building scales and pattern.
- Small number of passing motorists.
- Minimum intrusion on surrounding residents.

These characteristics are found to the greatest extent in the following four siting options, in order of preference.

1. LF-1E (case 1)
2. LF-3C (case 1)
3. LF-1E and PI-27E (cases 2 and 3)
4. LF-9C (case 1)

Characteristics which identify a siting option as having greatest potential to reduce visual impact through mitigation are as follows:

- Minimal amount of screening required.
- Minimal high priority areas of screening required.

When these indicators are combined with the previous indicators, the following four siting options are identified in order of preference:

1. LF-1E (case 1)
2. LF-3C (case 1)
3. LF-9C (case 1)
4. LF-1E and PI-27E (cases 2 and 3)

Siting option LF-1E ranked well above the other options since it satisfied the factors best. Ranked somewhat lower, options LF-3C and LF-9C were found to have visually incompatible surrounding land uses and least amounts of existing screening. Option LF-1E/PI-27E ranked lower due to larger volumes of passing traffic and more extensive mitigation potentially required. The other partially integrated options (LF-4N and PI-1N; LF-4N and PI-13N) ranked substantially lower in all the indicators.

The visual implications of the partial solidification option at the physical/chemical plant were examined at an overview level. No significant change to the rankings was foreseen due to this option.

Several further actions and detailed study should be undertaken by OWMC focusing on the preferred site when all factors and studies in this phase have been completed.

The detailed studies which should be undertaken include:

- detailed visual baseline data of the preferred site
- detailed visual data of the proposed facility
- detailed study and confirmation of the anticipated visual impacts
- community confirmation of visual impacts
- identify most appropriate mitigation recommendation
- establish monitoring program for visual change in the landscape

SECTION A

INTRODUCTION

SECTION A
INTRODUCTION

BACKGROUND TO THE STUDY

The Ontario Waste Management Corporation (OWMC) is currently undertaking the fourth phase in the Facility Development process to identify the most appropriate site(s) to accommodate a special waste treatment and disposal facility. This current phase involves the evaluation of candidate sites and the selection of preferred site(s) for detailed testing in Phase 4B.

Prior to identifying the candidate sites, the OWMC first narrowed the search to a geographic region which identified the Golden Horseshoe area of the Province; next, candidate areas were identified within the Golden Horseshoe for the various facility components; then, eight candidate sites were identified within the candidate areas for comparative study. This study is part of the socio-economic considerations of the comparative assessment.

It should be clarified at this point that initially there were eight candidate sites and eight siting options under consideration in this study.[1] Since the dropping of LF-2N, only seven sites remained. The meaning of the terms, candidate sites and siting options will be explained later in this report (See Section B - Preliminary investigations.) The seven candidate sites are illustrated on Figure 1.

PURPOSE OF THIS REPORT

The purpose of this report is to document the study carried out on aspects of visual impact assessment associated with the eight sites selected by the Ontario Waste Management Corporation as candidates for the development of the special waste treatment disposal facilities. As part of the socio-economic impact analysis, the OWMC wished to have an overview of the extent to which there is visual intrusion at each site and what general steps might be taken to mitigate this intrusion.

The specific objectives to be achieved in the study are:

1. An overview of the extent to which there is visual impact at each of the siting options through the construction of one or more specific special waste treatment and/or disposal facilities;

2. Identification of appropriate and effective general mitigative measures which can be utilized to minimize these potential visual impacts;

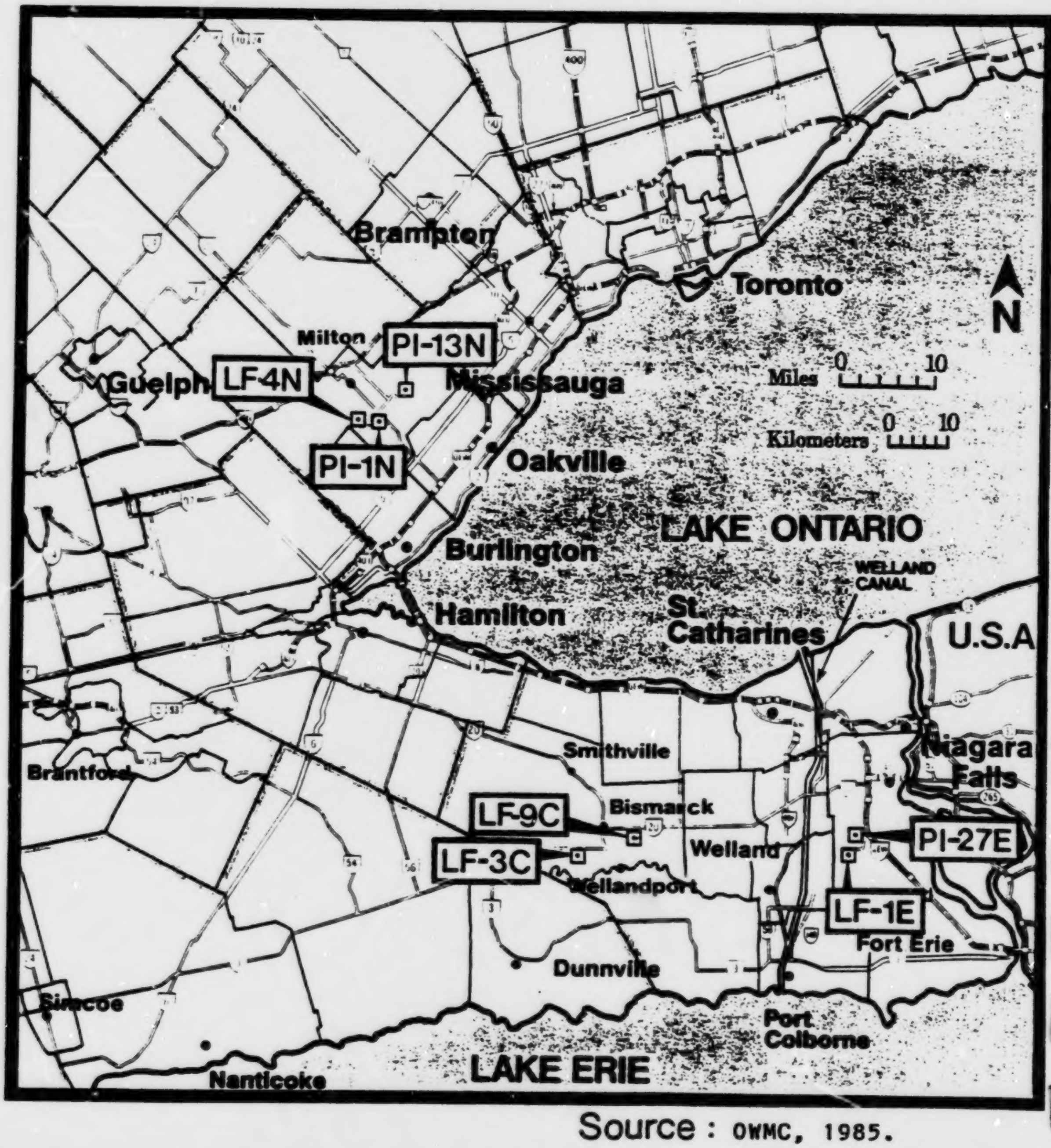
---

[1] Site LF-2N was dropped from consideration part way through Phase 4A because it failed to provide natural containment. Partially integrated siting options PI-1N/LF-2N and PI-13N/LF-2N, therefore were also dropped from consideration. Refer to M.M. Dillon Ltd., Interim Site Selection Report - Candidate Site LF-2N, 1985, for details of this decision.

Figure 1 Location of Candidate Sites

Legend

⊡	Candidate Site
▬	Regional Municipal & County Boundaries
—	Township, Town & City Boundaries
LF	Landfill
PI	Physical/Chemical Treatment Plant & Incineration


Brampton
Toronto
N
Milton
PI-13N
Guelph
LF4N
Mississauga
Miles 0 10
Kilometers 0 10
PI-1N
Oakville
LAKE ONTARIO
Burlington
WELLAND CANAL
Hamilton
St. Catharines
U.S.A
Smithville
Niagara Falls
Brantford
LF-9C
Bismarck
Welland
PI-27E
LF-3C
Wellandport
LF-1E
Fort Erie
Dunnville
Simcoe
Port Colborne
Nanticoke
LAKE ERIE

Source : OWMC, 1985.

3. Identification of factors and indicators which can be used to measure, in general terms, the potential level of visual impact at each site, and finally;

4. Definition and application of a procedure for ranking the siting options in order of preference.

STUDY PROCESS

The process developed for the visual assessment addresses the four basic objectives of the study. The following characteristics were important to emphasize in the study process:

- the need for factual data where possible
- the need for comparative data for each site/facility combination
- the ability to predict visual intrusion
- the need for analysis results without mitigation measures
- the need for analysis results with mitigation measures
- the need to identify factors for scoring and ranking of site/facility options
- the need to rank siting options

A four stage process was identified to accomplish these needs:

1. Site and Facility Familiarization

This step involved the gathering of data concerning each of the facility types and identifying their visual characteristics. In addition, base mapping, site photography and personal observations were made for each of the eight candidate sites.

The various site/facility combinations (cases) and siting options were reviewed based on these preliminary investigations.

2. Analysis

A series of individual site analyses were undertaken which were structured to identify basic facts and make general predictions regarding potential visual impact.

These analyses were broken down into Pre-Mitigation and Post-Mitigation analyses.

3. Identification of Factors and Indicators

In order to utilize the analysis findings for the evaluation of site/facility variations, a factor development process was undertaken. A series of preliminary factors were initially developed and refined through consultation with the Institute of Environmental Research and OWMC.

Two major groupings were identified. These include the following:

- Impacts on local environs and residents

- Impacts on the broader region and visitors

Impacts on the local environs and residents were deemed to have greater significance since any impacts would be felt on a daily basis in the community.

Three indicators were used to predict impacts on the local environs and residents:

- Visual absorption potential
- Visual compatibility
- Intrusion on surrounding residents

Impacts on the region and nonresidents were deemed to have somewhat less significance and were measured by two indicators:

- Special site exposure (from designated viewing points)
- Intrusion by passing traffic

The preceding indicators were completed without mitigative measures. Two further indicators were identified with mitigative measures in place:

- Mitigative recommendations
- Mitigative priorities

Since mitigation is part of the process, the final ranking was based on all the above indicators.

4. Comparative Evaluation of Siting Options

Based on the analysis findings and rank for each case possibility, rankings were compiled for the siting options. This evaluation was done both before and after mitigation measures. The composite scores for the siting options were totalled and ranks assigned to each option. Conclusions and limitations of these results were then summarized.

RELATIONSHIP OF VISUAL IMPACT STUDY TO OTHER 4A STUDIES

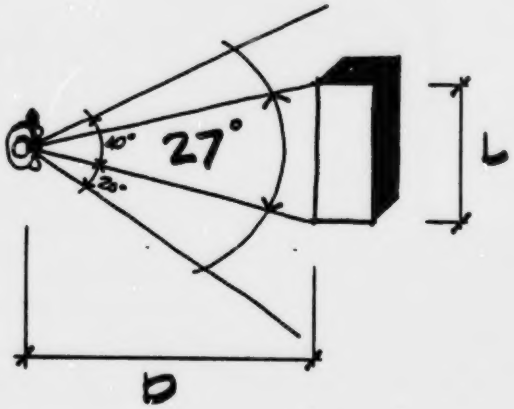
This visual impact assessment was part of the social impact assessment. Several other studies, by other consultants, were also referred to during the course of this study as follows:

Study	Consultant	Relationship to Social Study
Analysis of Official Plans /Land Use	Leon Kentridge Associates Ltd. (LKA)	- LKA provided the number and location of residential dwellings in the 2km study area. - LKA provided documentation of existing land use and future land use designations.
Engineering	Monenco Limited	- Monenco provided inputs regarding facility characteristics
Site Selection	M.M.Dillon Ltd.	- Dillon provided overall direction and coordination of the site selection process.
Transportation	M.M.Dillon Ltd.	- Dillon provided traffic count data.
Tourism	Laventhol & Horwath	- Laventhol & Horwath provided data on tourism related features.
Tourism	Jack B. Ellis & Associates	- Jack B. Ellis and Associates provided case study data on tourism impacts.

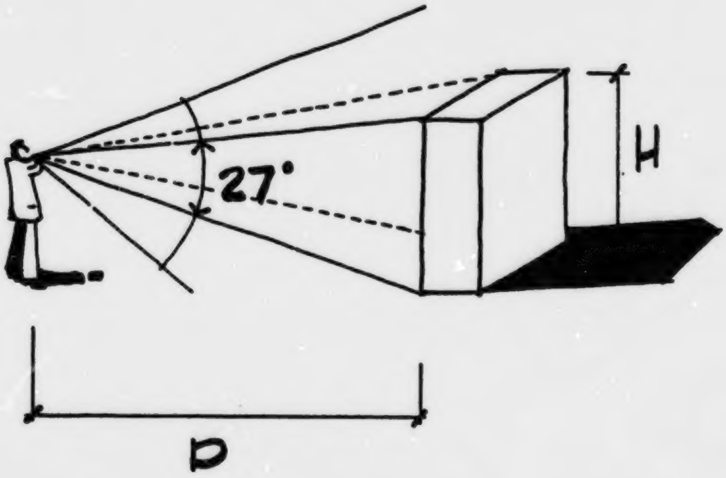
VISUAL TERMINOLOGY

A number of basic visual terms, factors and characteristics have been identified which are basic to the understanding of this visual assessment. For this reason, a series of these have been included as part of this introduction:

1. **Cone of Vision**
   - The normal cone of vision of the human eye from a static viewpoint is illustrated below.[3]



Plan



Elevation

D = Distance of object being observed from observer

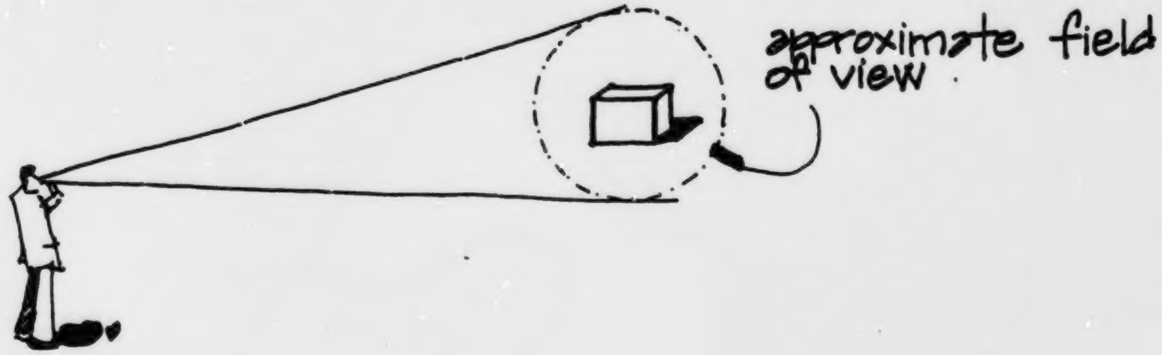
L = Length of object being observed

H = Height of object being observed

---

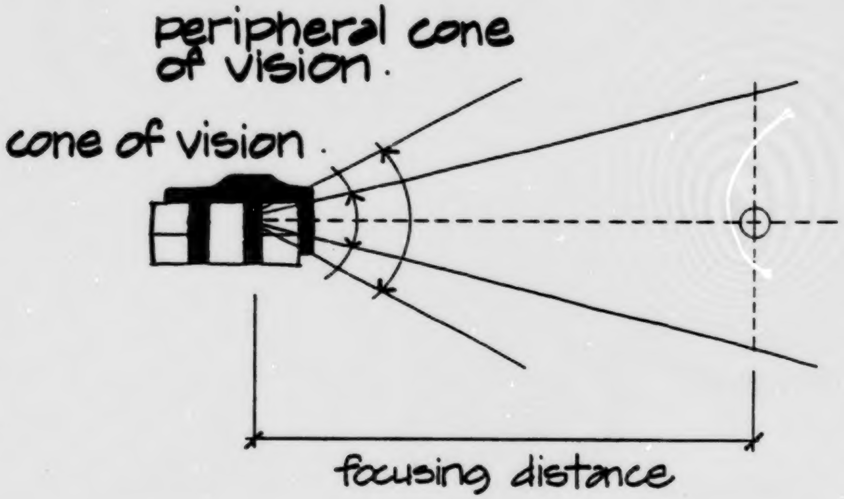
[3] EDAW Inc., *Visual Sensitivity of River Recreation to Power Plants*. Minnesota Environmental Quality Board, p. 34, April, 1978.

- The visual dominance of an object diminishes as its relative presence in the field of view grows smaller as illustrated below.



	- DOMINANCE OF OBJECT IN FIELD OF VIEW -
L=H=D	• analyze in detail.
L=H=2D	• seen as an unit.
L=H=3D	• dominant in the visual field, but tends to be seen in relation to others.
L=H=4D+	• becomes part of the general scene.

- The cone of peripheral vision from dynamic viewpoints grows narrower as speed increases as illustrated below.


peripheral cone of vision.
cone of vision.
focusing distance

Viewer Cone of Vision Relative to Speed[4]

design speed	focusing distance	cone of vision	peripheral cone of vision
64 Kph (40 mph)	335 m. (1100 ft)	37°	60°
80 Kph (50 mph)	426 m. (1400 ft.)	29°	55°
96 Kph (60 mph)	548 m. (1800 ft.)	20°	45°

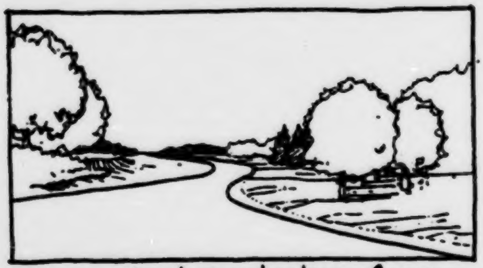
---

[4] Source: Hornbeck, Okerlund: Visual Values for the Highway User: An Engineer's Workbook. U.S. Department of Transportation, Federal Highway Administration, p. 114-115, 1973.

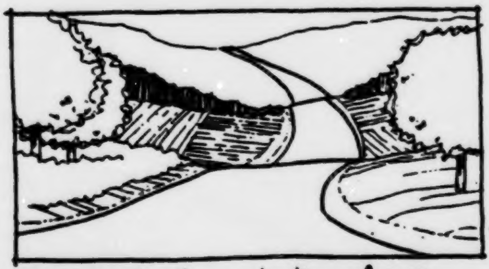
2. Visual Penetration[5]

- Visual penetration refers to the extent to which a viewer's vision focuses on the peripheral areas while moving. As speed increases, concentration increases, the point of concentration recedes, foreground detail begins to fade and space perception becomes impaired.

- Visual penetration as determined by road alignment and gradient.



Driver's visual penetration of surroundings decreases with increasing no. of turns in road, thus demanding more driving concentration.



Driver's visual penetration of surroundings decreases with increasing no. of changes of grade in road, thus demanding more driving concentration.

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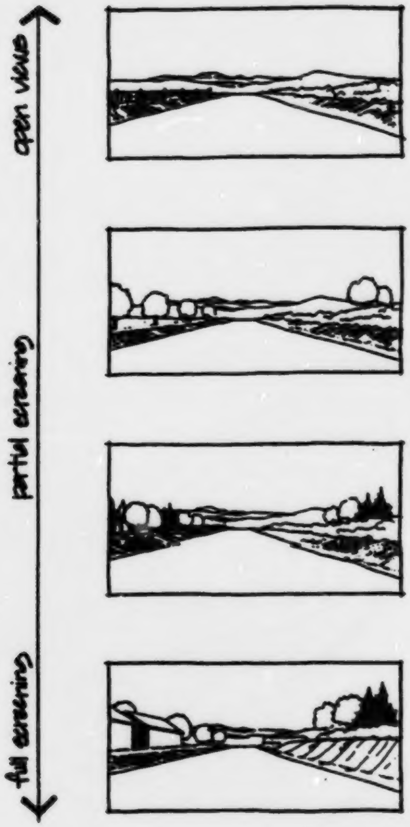
[5] Source: Hornbeck, Okerlund: Visual Values for the Highway User: An Engineer's Workbook. U.S. Department of Transportation, Federal Highway Administration, p. 114-115, 95-107, 1973.

- **Visual Penetration as Determined by Visual Edge Conditions**[6]As the degree of visual edge becomes more structured, the focus of view becomes more concentrated and contained.


open views
partial screening
full screening

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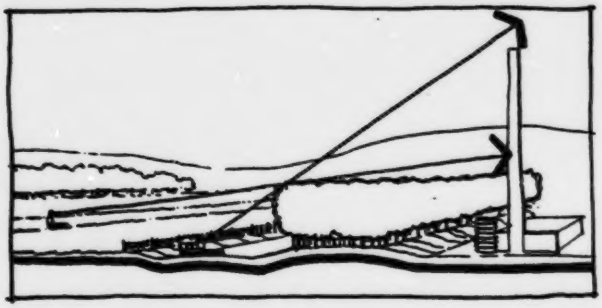
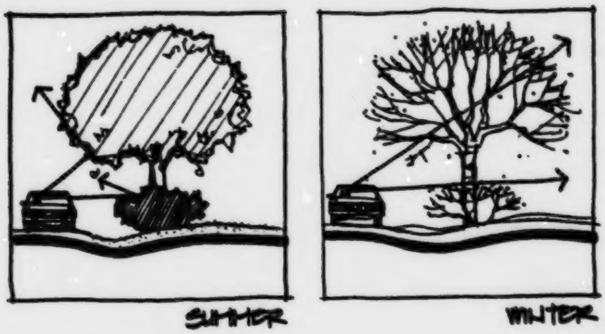
[6] Source: Hornbeck, Okerlund: *Visual Values for the Highway User: An Engineer's Workbook*. U.S. Department of Transportation, Federal Highway Administration, p. 95-107, 1973.

- **Visual Penetration as Determined by Distance of Observer From Visual Edge**[7] The closer the viewer is to an effective visual edge, the greater its buffering potential. As the viewer moves further from the visual edge, the more exposed the hidden objects become.



- **Visual Penetration as Determined by Visual Edge and Seasonality** Deciduous plant material loses its visual buffering potential during the late fall, winter and early spring to some extent. However, the screening produced by tree trunks, branches and twigs contributes some mitigative effect.



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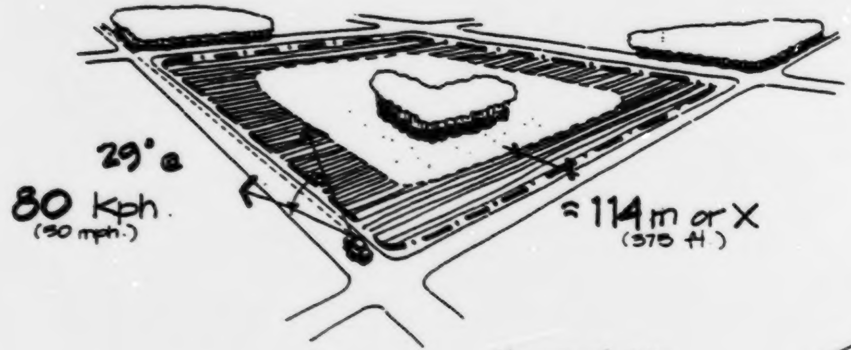
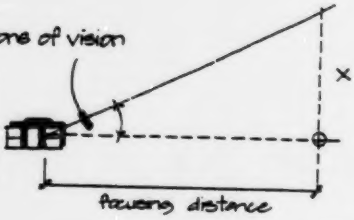
[7] Source: Ibid.

- **Calculation of Visual Penetration**[8] As speed increases, the driver's peripheral cone of vision into the roadway surroundings, decreases. To identify the anticipated amount of penetration a vehicle speed of 80 km./hr. was used since it is a low average speed for vehicles on rural highways.


29° @
80 Kph.
(50 mph.)
≈ 114 m or X
(375 ft.)

$$\text{tangent } 1/2 \text{ cone of vision} = \frac{X}{\text{focusing distance}}$$


1/2 cone of vision
x
focusing distance

For the purposes of the analysis carried out for this report, views from the vehicle by passengers was also considered. This involves full, unrestricted view to the site where possible.

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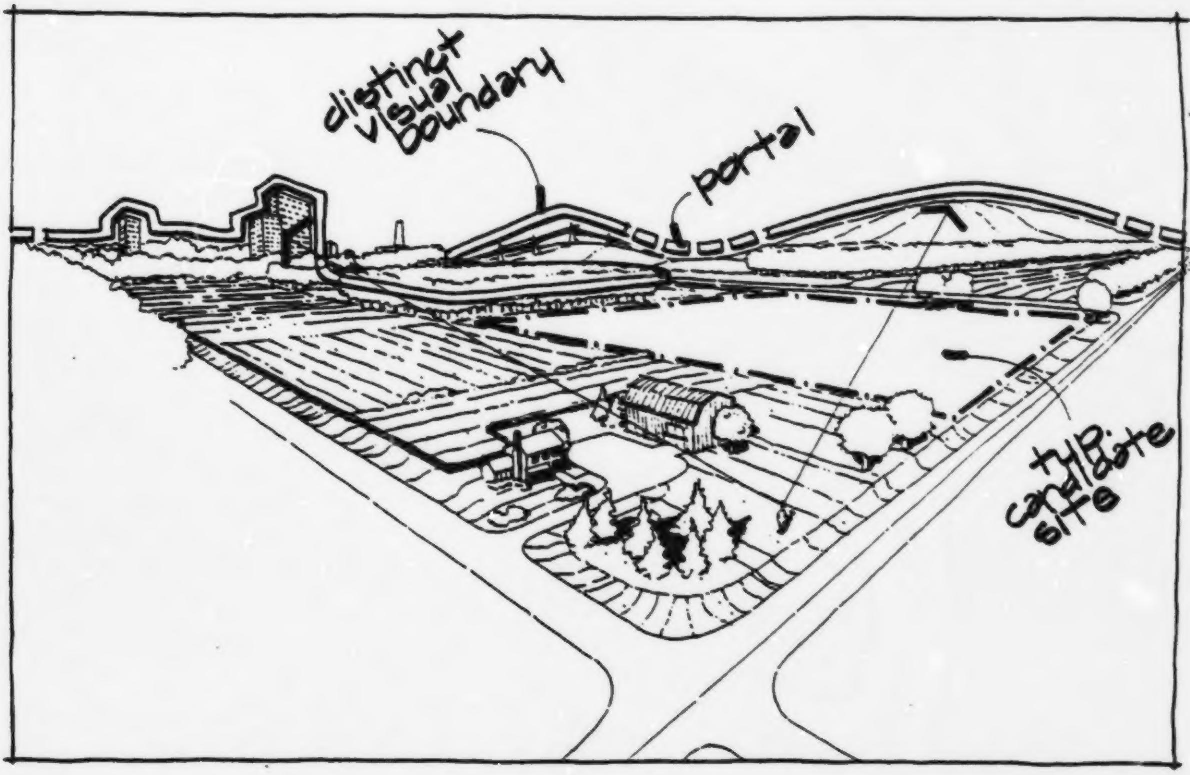
[8] Source: Ibid.

3. **Visual Unit and Visual Unit Boundaries**[9] The visual unit concept subdivides the landscape into coherent, spatially-defined units. The **visual unit** is defined as a portion of the landscape enclosed and limited by topography, major vegetative masses or built form, which constitutes a boundary for the observer's field of view. This concept was applied to the analyses undertaken in this study to aid in determining numbers of viewers within the visual unit of the proposed facility.

A modified version of this concept, the "viewshed", was used in this assessment and is described on subsequent pages.



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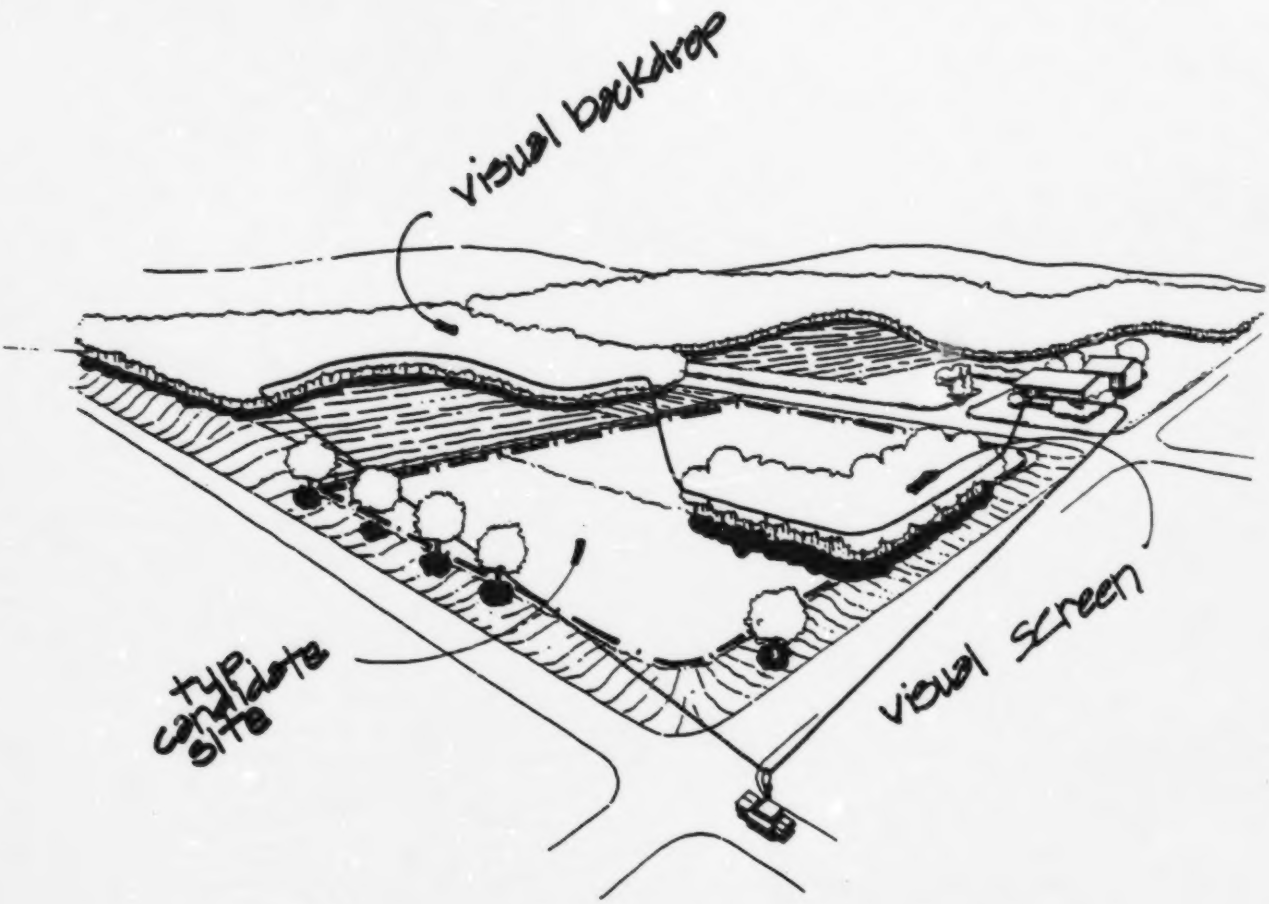
[9] Source: Ibid.

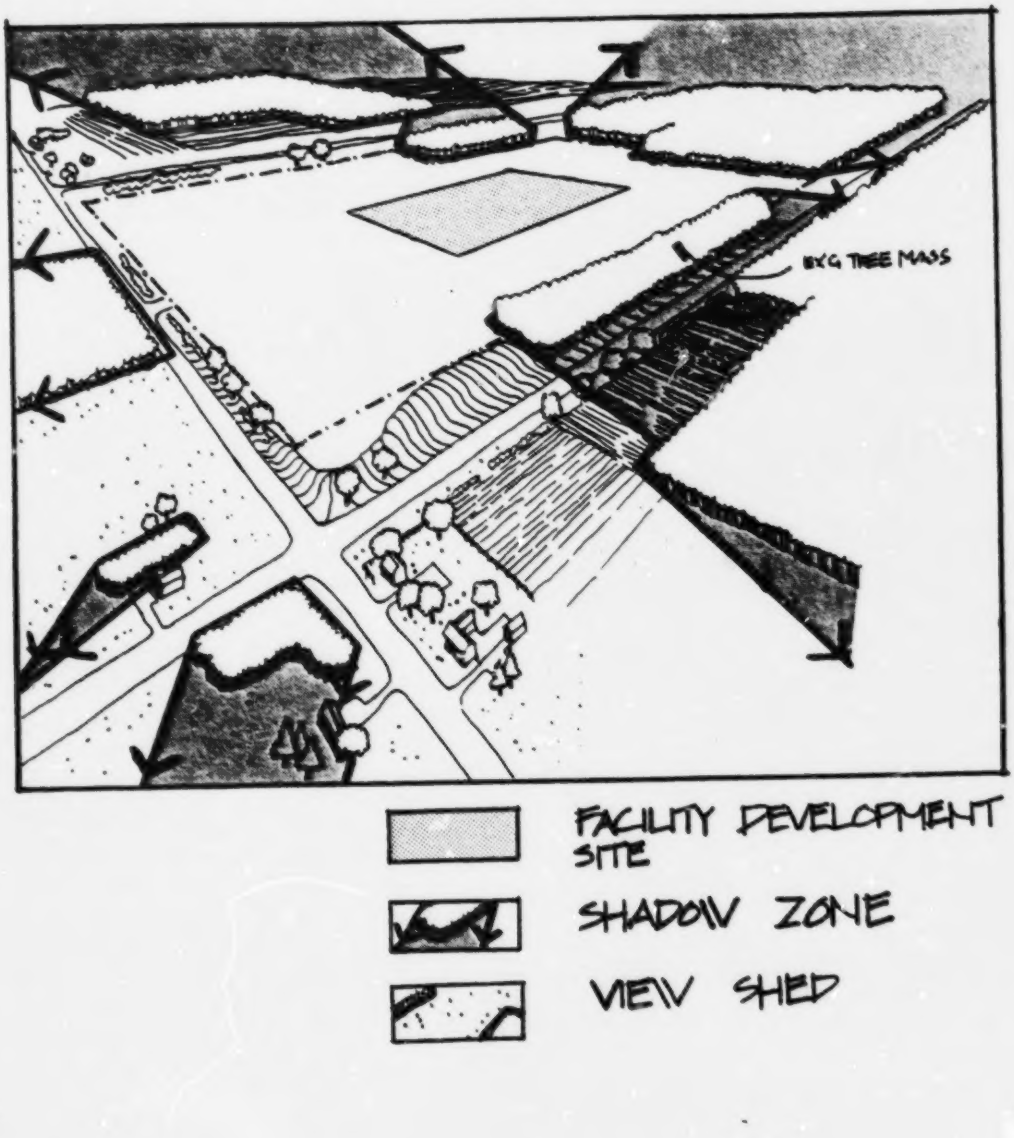
4. **Visual Backdrop vs. Visual Screen**[10] The visual backdrop represents the extent of a particular ground level view within the visual unit which creates spatial containment. The visual buffer is a foreground feature which modifies the scope of vision and prevents or modifies visual penetration of part of the visual unit.


visual backdrop
typ. candidate site
visual screen

---

[10] Source: Ibid.

5. Viewshed Impact[11] The viewshed from a proposed facility can be calculated by superimposing the facility area onto the site and projecting the visual unit definition lines into the surrounding landscape. In this way the areas within the groundlevel viewshed are clearly identified.


EX'G TREE MASS
FACILITY DEVELOPMENT SITE
SHADOW ZONE
VIEW SHED

---

[11] Source: Ibid.

6. Visual Impact as Related to Foreground, Middleground and Background[12]

The significance of the visual impact of a proposed facility is based on the degree of change in a particular view as well as the extent to which it is present in the field of view. This presence in the field of view diminishes with distance. That is, the presence is much greater when viewed from close up than farther away.

A classification system for what we can see from various distances is necessary in order to identify levels of impact based on distance. The three distance zones are called foreground, middleground and background.

Although these "grounds" are not precise cut-off points, they are general zones which help us discuss distance. Depending on the scale of the object or landscape being viewed, these zones vary. For the purpose of this study, we have described these zones as follows:

Foreground - When the proposed facility is within the viewer's foreground (0-0.8 km), its presence is very great since it fills the field of view.

Middleground - When the proposed facility is within the middleground (0.8-5.0 km) the presence of the facility is somewhat dominant since it occupies a smaller portion of the field of view.

Background - When the proposed facility is beyond the middleground zone (5.0 km plus), its presence in the field of view diminishes substantially and it is not considered a dominant element.

Figures 2 and 3 illustrate the degree of presence of the proposed facility within the field of view (27°) to approximate scale as well as the visual characteristics within each of the "grounds".

In addition, it has been identified that visual impacts would be more severe in foreground areas vs background area. These impact zones are summarized as follows:

High visual impact occurs within the foreground zone (0-0.8 km) from the facility.

Medium visual impact occurs within the middleground zone (0.8-5.0 km) from the facility.

Low visual impact occurs within the background zone (over 5.0 km) from the facility.

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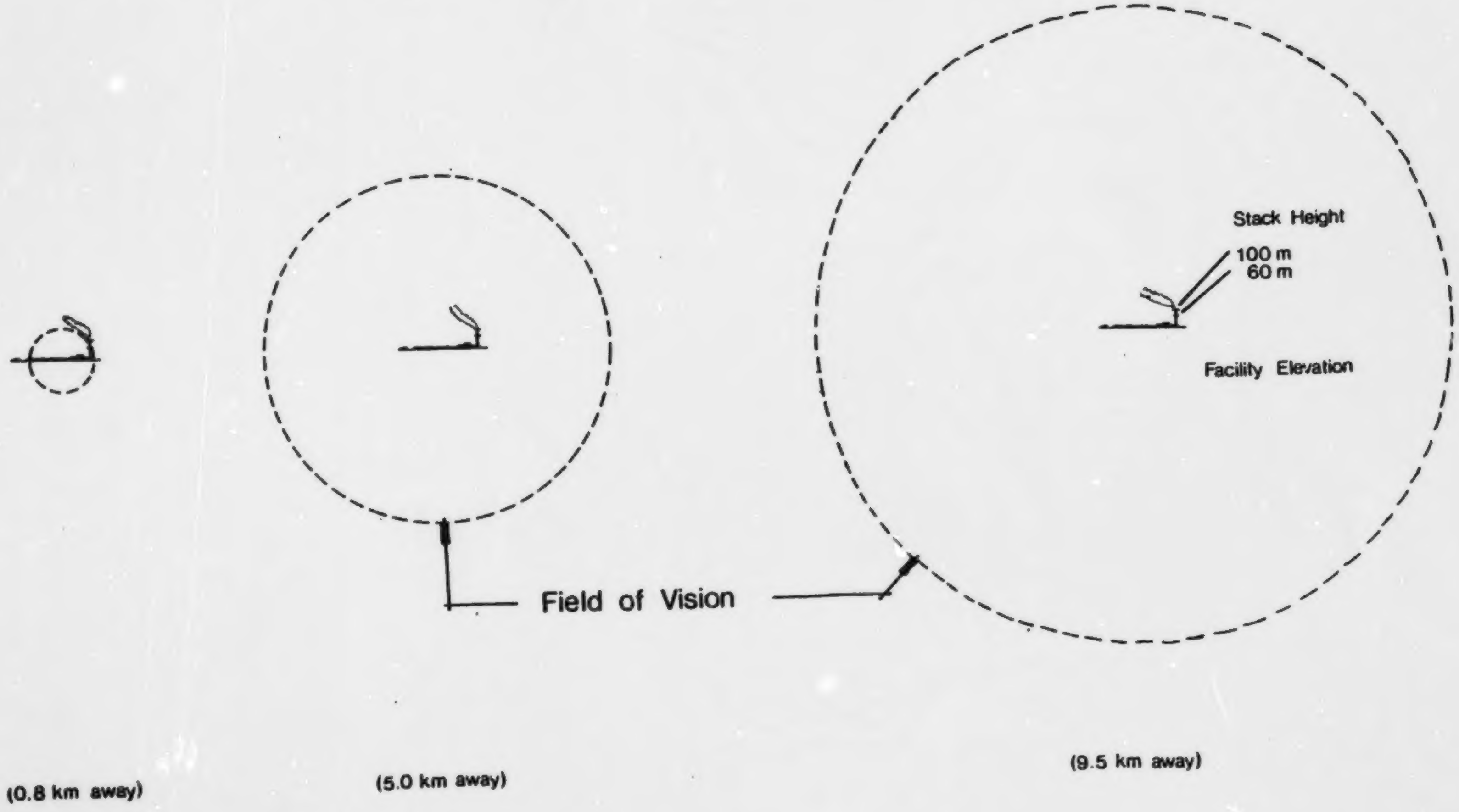
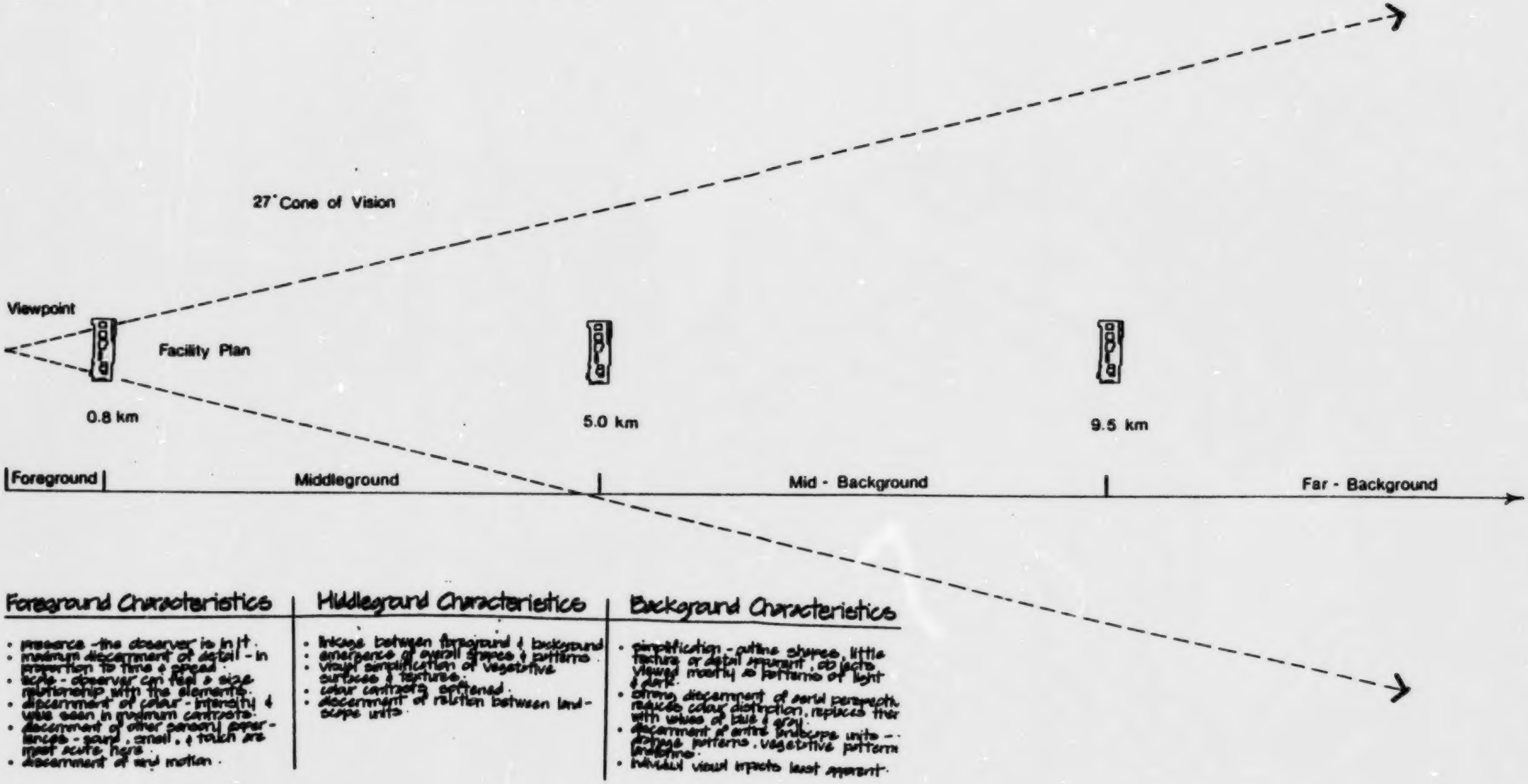
[12] Source: EDAW Inc. - Visual Sensitivity of River Recreation to Power Plants. Minnesota Environmental Quality Board, 1978, pages 34-35.

Figure 2 - Field of Vision at Varying Distances


Stack Height
100 m
60 m
Facility Elevation
Field of Vision
(0.8 km away)
(5.0 km away)
(9.5 km away)

Source: EDAW Inc. - Visual Sensitivity of River Recreation to Power Plants
Minnesota Environmental Quality Board, 1978, Page 35.

Figure 3 - Visual Characteristics at Varying Distances



Foreground Characteristics	Middleground Characteristics	Background Characteristics
• presence - the observer is in it. • maximum discernment of detail - in proportion to time & speed. • scale - observer can feel a size relationship with the elements. • discernment of colour - intensity & value seen in maximum contrasts. • discernment of other sensory experiences - sound, smell, & touch are most acute here. • discernment of wind motion.	• linkage between foreground & background • emergence of overall shapes & patterns. • visual simplification of vegetative surfaces & textures. • colour contrasts softened. • discernment of relation between landscape units.	• simplification - outline shapes, little texture or detail apparent, objects viewed mostly as patterns of light & dark. • strong discernment of aerial perspective reduces colour distinction, replaces them with values of blue & gray. • discernment of entire landscape units - drainage patterns, vegetative patterns, landforms. • individual visual impacts least apparent.

Source: National Forest Landscape Management - Volume 1 - Forest Service - U.S. Department of Agriculture
- Agriculture Handbook No. 434, Pages 56 and 57.

SECTION B

PRELIMINARY INVESTIGATIONS

SECTION B
PRELIMINARY INVESTIGATIONS

INTRODUCTION

In order to carry out the visual analysis, basic information was gathered and documented. Considerations in this preliminary investigation included the visual aspects of the proposed facility components and their various arrangements as well as the visual character of each of the eight candidate sites.

It should also be stressed, that this study is an initial overview and many detailed decisions on plant layout, design and materials were not available. The analysis carried out however, though general, was sufficient for Phase 4A. The purpose of this section of the study was to gain general information sufficient to identify the eventual siting option rankings.

FACILITY CHARACTERISTICS ASSUMPTIONS

There are three basic facility components:

- incinerator
- physical/chemical treatment plant
- landfill

The following are the basic visual assumptions that were made for each of the three components.

1. Incinerator

The following characteristics were identified through discussions with OWMC and Monenco regarding the incinerator:

- the architectural treatment of this facility was not finalized during this study, however, it was assumed that the most beneficial treatments including cladding, appropriate colour selection and simplicity would be used to minimize the 'industrial' image of the incinerator.

- some security lighting would be required but would likely be directed downward and would not be a major visual problem.

- it is likely that the stack would require some form of warning lights for aircraft.

- it was assumed that the incinerator stack would be the most difficult facility to screen at any of the sites due to its overall scale, stack height (100m) and plume (if visible).

- no plume considered for this analysis since its characteristics were not defined when this study was undertaken.

2. Physical/Chemical Treatment

The following visual characteristics were identified for the physical chemical treatment plant through discussions with OWMC and the Monenco Report:[13]

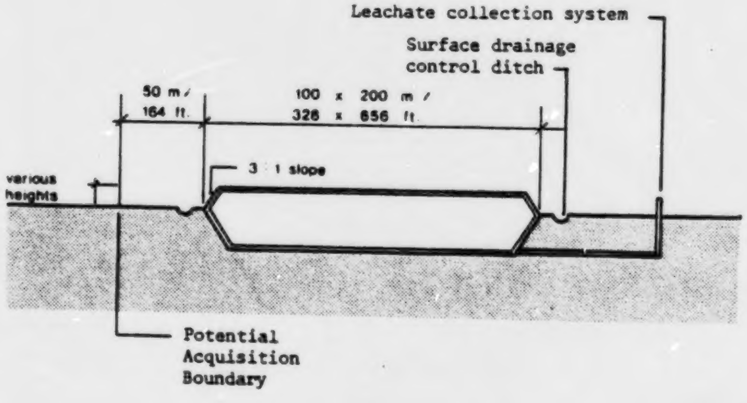
- the architectural treatment of this facility was not finalized for this study, however based on similar facilities elsewhere, it was assumed that the plant would utilize simple volumetric buildings treated with simplicity of form, colour and texture similar to other industrial or warehouse-like facilities.
- the administration building/laboratory would consist of a two story building similar to many industrial buildings of a similar nature.
- it was assumed for this study that this component could be more easily visually integrated into any of the sites than the incinerator since it resembled many other industrial-type facilities.

3. Landfill

The following visual assumptions were made for the landfill component through discussions with OWMC and Monenco:

CELL HEIGHTS

LF-1E	1.5m or 4.9 ft. Height
LF-3C LF-9C	4.0m or 13.0 ft. Height
LF-4N	12.0m or 39.4 ft. Height


Leachate collection system
Surface drainage control ditch
50 m / 164 ft.
100 x 200 m / 328 x 656 ft
3 : 1 slope
various heights
Potential Acquisition Boundary

Typical Landfill Cell Section

---

[13] Status Report: Facility Design: Monenco Limited, April 1985.

- maximum height of landfill was assumed to be within a range from 1.5 to 12m above existing grade depending on the site.
- side slopes would be approximately 3:1
- a minimum setback of 50m from the property boundary was assumed
- a conventional engineered landfill type was assumed for this study
- a series of these landfill cells would be grouped in a restricted area, and utilized one-by-one over a period of time.
- each landfill cell, when completely filled, would be covered and treated with some landscaped surface.

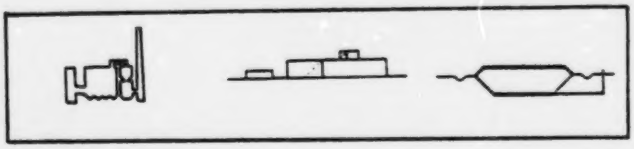
4. Facility Combinations

Three typical facility combinations (cases) are considered in this study.

They are described as follows:

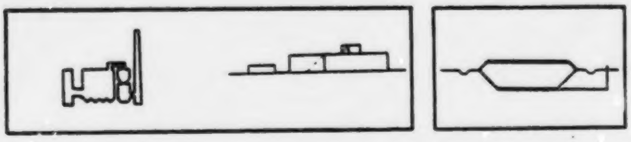
CASE 1

- **Fully Integrated**
  - **one site**



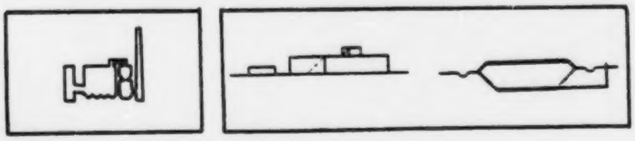
CASE 2

- **Partially Integrated**
  - **two sites**



CASE 3

- **Partially Integrated**
  - **two sites**



The typical plans and elevations which illustrate the plant layouts for the various cases as provided by Monenco, are summarized in Figures 4, 5, 6, 7 and 8.

SITING OPTIONS

The eight candidate sites have been designated for particular facility arrangements. These are summarized below:

Site	**Proposed Facility Arrangement**
LF-4N - Town of Milton	Landfill only or landfill and physical/chemical treatment plant.
PI-1N - Town of Milton	Incinerator only **or** physical/chemical treatment plant and incinerator.
PI-13N - Town of Milton	Incinerator only **or** physical/chemical treatment plant and incinerator.
LF-3C - Township of West Lincoln	Fully integrated.
LF-9C - Township of West Lincoln	Fully integrated.
LF-1E - City of Niagara Falls	Fully integrated **or** landfill only **or** landfill and physical/chemical treatment plant.
PI-27E - City of Niagara Falls	Incinerator only **or** physical/chemical treatment plant and incinerator.

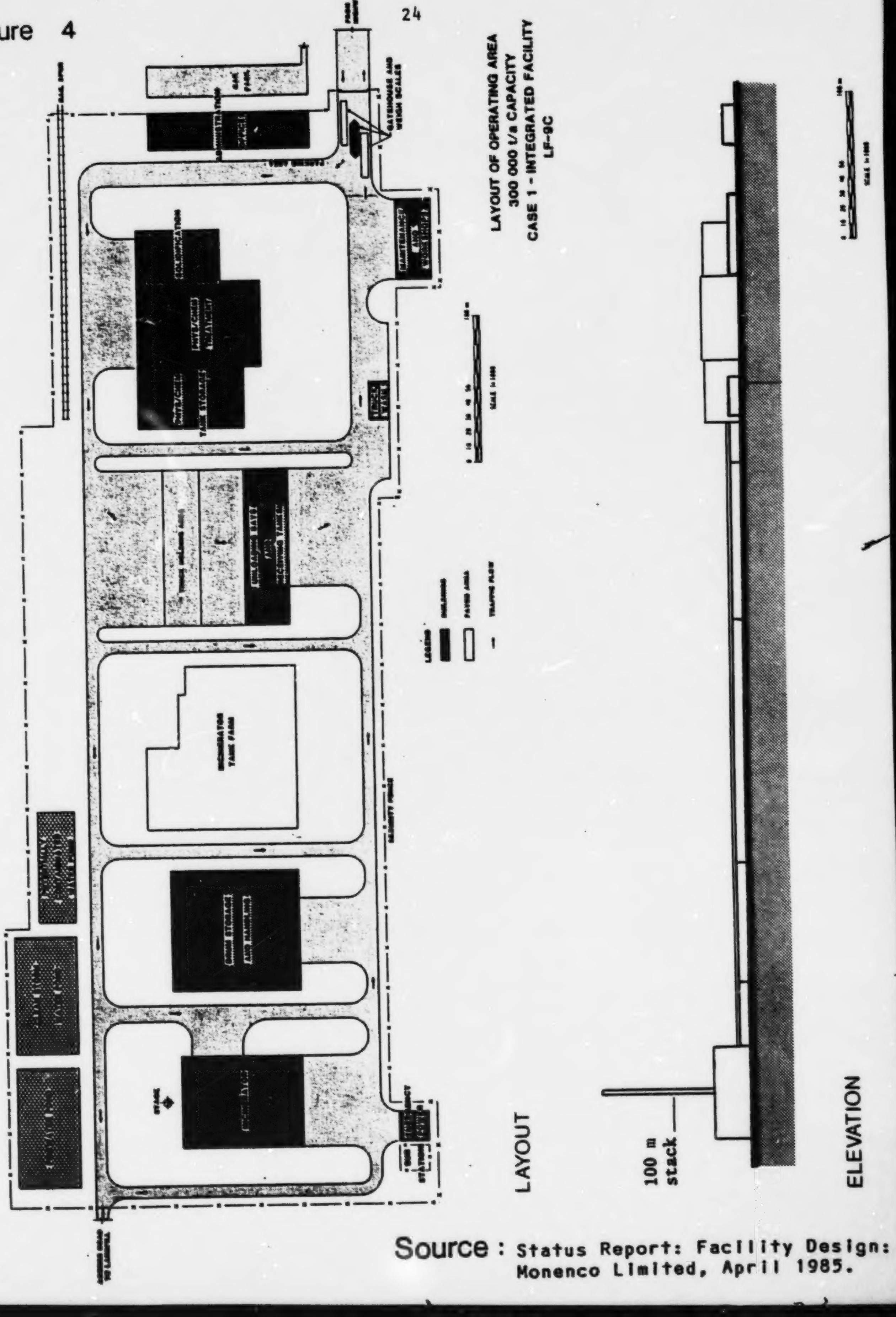
These candidate sites represent individual sites only, not the possible siting options. The **siting options** are identified as the various combinations of possible, suitable sites and facilities. Since the fully integrated sites can operate fully independently and require only one site, they are each considered one siting option. The sites designated as physical/chemical treatment plant and/or incinerator must have an associate landfill site in reasonably close proximity and therefore must be seen in combination. The following list represents the possible siting options:

Case 1 **(Fully Integrated)**	**Cases 2 and 3** **(Partially Integrated)**
LF-1E	LF-1E and PI-27E
LF-3C	
LF-9C	LF-4N and PI-1N

This study will carry out visual investigations on each of these siting options.

Figure 4

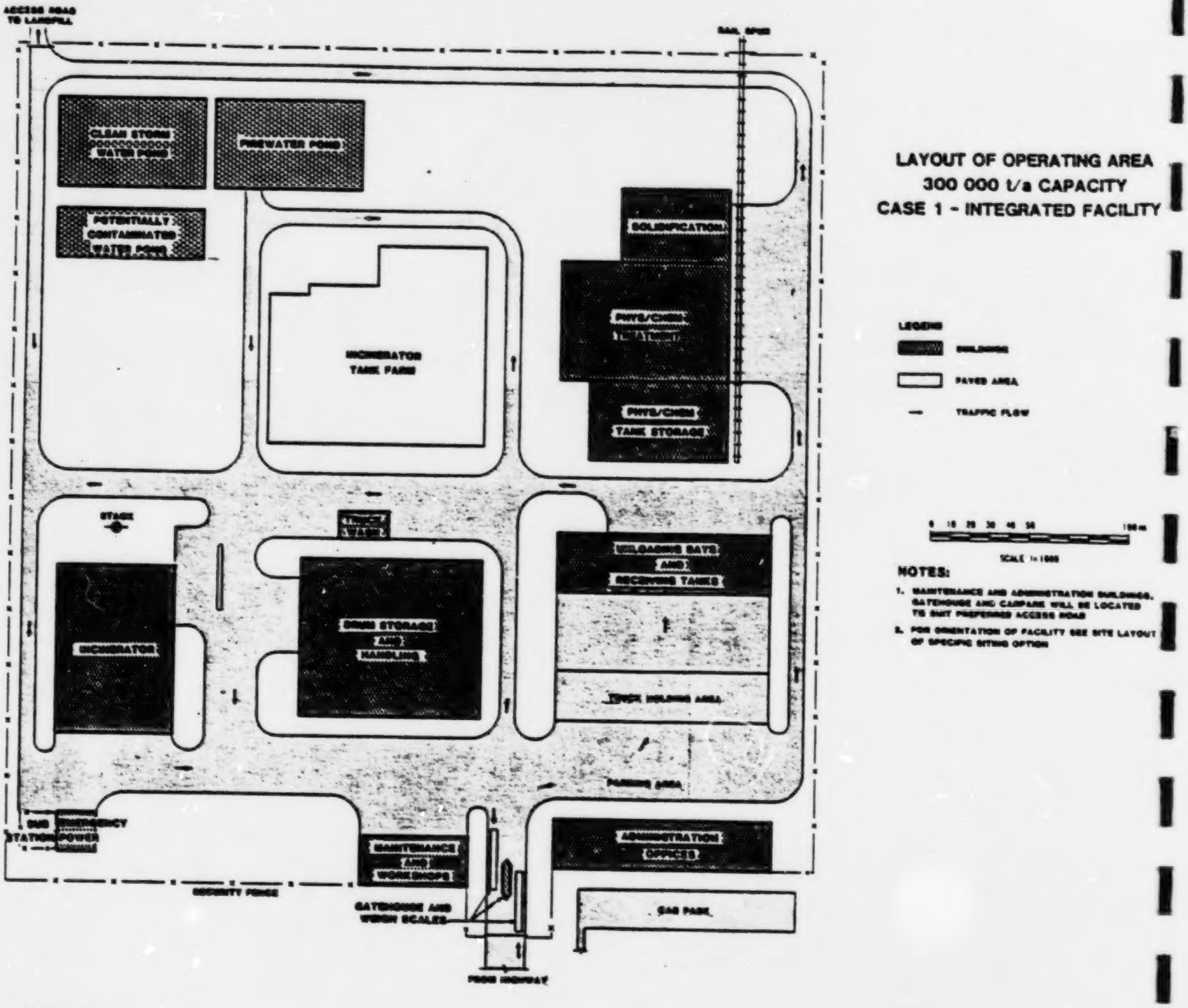
case 1


LAYOUT OF OPERATING AREA
300 000 t/a CAPACITY
CASE 1 - INTEGRATED FACILITY
LF-9C
GATEHOUSE AND WEIGH SCALES
ADMINISTRATION
INCINERATOR TANK FARM
LEGEND
BUILDINGS
PAVED AREA
TRAFFIC FLOW
SECURITY FENCE
STACK
LAYOUT
100 m stack
ELEVATION

Source : Status Report: Facility Design: Monenco Limited, April 1985.

Figure 5

case 1

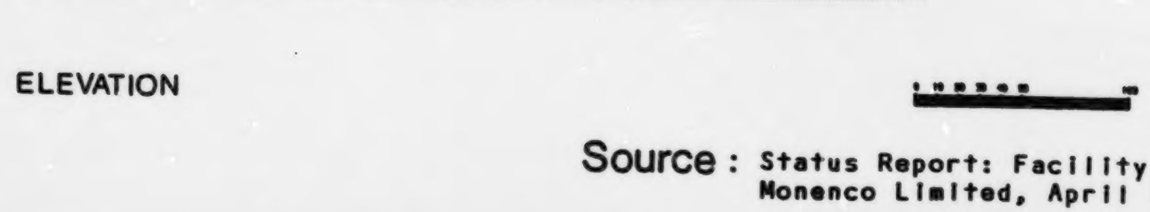

ACCESS ROAD TO LANDFILL
RAIL SPUR
CLEAN STORM WATER POND
FIREWATER POND
POTENTIALLY CONTAMINATED WATER POND
INCINERATOR TANK FARM
SOLIDIFICATION
PHYS/CHEM TREATMENT
PHYS/CHEM TANK STORAGE
STACK
TRUCK WASH
UNLOADING BAYS AND RECEIVING TANKS
INCINERATOR
DRUM STORAGE AND HANDLING
TRUCK HOLDING AREA
PARKING AREA
SUB STATION
EMERGENCY POWER
MAINTENANCE AND WORKSHOPS
ADMINISTRATION OFFICES
GATEHOUSE AND WEIGH SCALES
CAR PARK
SECURITY FENCE
FROM HIGHWAY
LEGEND
BUILDINGS
PAVED AREA
TRAFFIC FLOW
0 10 20 30 40 50 100 m
SCALE 1:1000

LAYOUT OF OPERATING AREA
300 000 t/a CAPACITY
CASE 1 - INTEGRATED FACILITY

NOTES:

1. MAINTENANCE AND ADMINISTRATION BUILDINGS, GATEHOUSE AND CARPARK WILL BE LOCATED TO SUIT PREFERRED ACCESS ROAD
2. FOR ORIENTATION OF FACILITY SEE SITE LAYOUT OF SPECIFIC SITING OPTION

LAYOUT

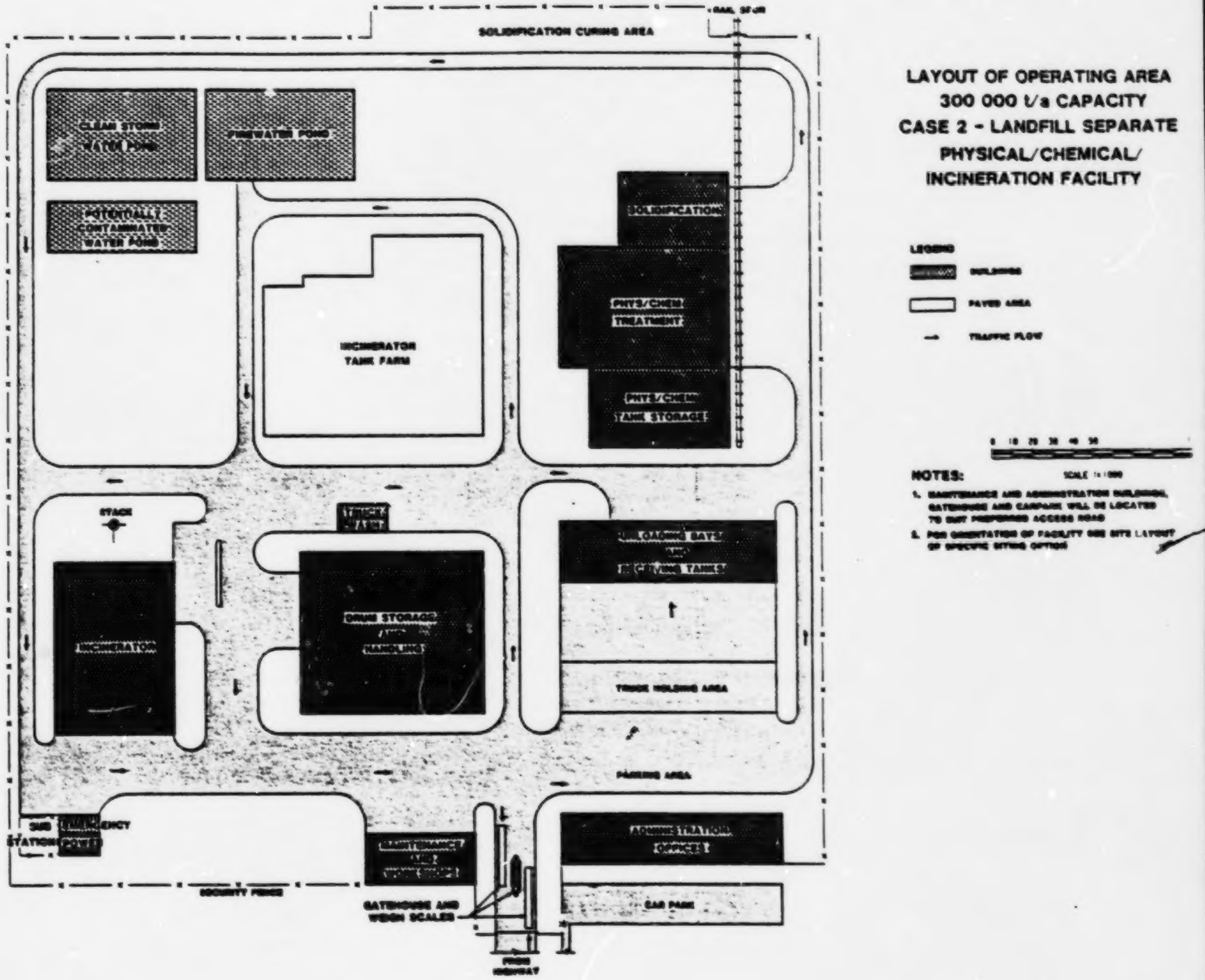

100 m
stack
0 10 20 30 40 50 100

ELEVATION

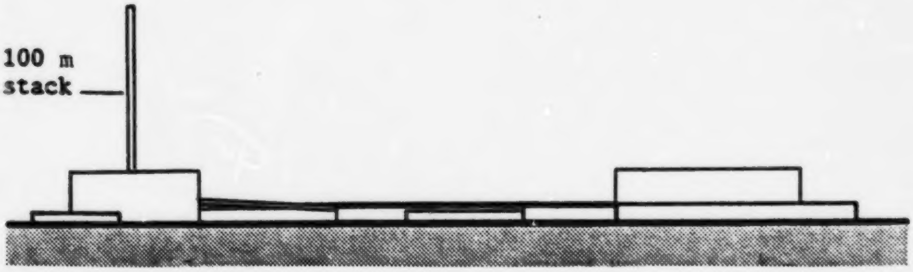
Source : Status Report: Facility Design:
Monenco Limited, April 1985.

Figure 6

case 2


LAYOUT OF OPERATING AREA
300 000 t/a CAPACITY
CASE 2 - LANDFILL SEPARATE
PHYSICAL/CHEMICAL/
INCINERATION FACILITY
LEGEND
BUILDINGS
PAVED AREA
TRAFFIC FLOW
0 10 20 30 40 50
SCALE 1:1000
NOTES:
1. MAINTENANCE AND ADMINISTRATION BUILDINGS, GATEHOUSE AND CARPARK WILL BE LOCATED TO SUIT PREFERRED ACCESS ROAD
2. FOR ORIENTATION OF FACILITY SEE SITE LAYOUT OF SPECIFIC SITING OPTION
RAIL SPUR
SOLIDIFICATION CURING AREA
CLEAN STORM WATER POND
FIREWATER POND
POTENTIALLY CONTAMINATED WATER POND
INCINERATOR TANK FARM
SOLIDIFICATION
PHYS/CHEM TREATMENT
PHYS/CHEM TANK STORAGE
STACK
TRUCK WASH
UNLOADING BAYS AND RECEIVING TANKS
INCINERATOR
DRUM STORAGE AND HANDLING
TRUCK HOLDING AREA
PARKING AREA
SUB STATION
EMERGENCY POWER
MAINTENANCE AND WORKSHOPS
ADMINISTRATION OFFICES
SECURITY FENCE
GATEHOUSE AND WEIGH SCALES
CAR PARK
FROM HIGHWAY

LAYOUT

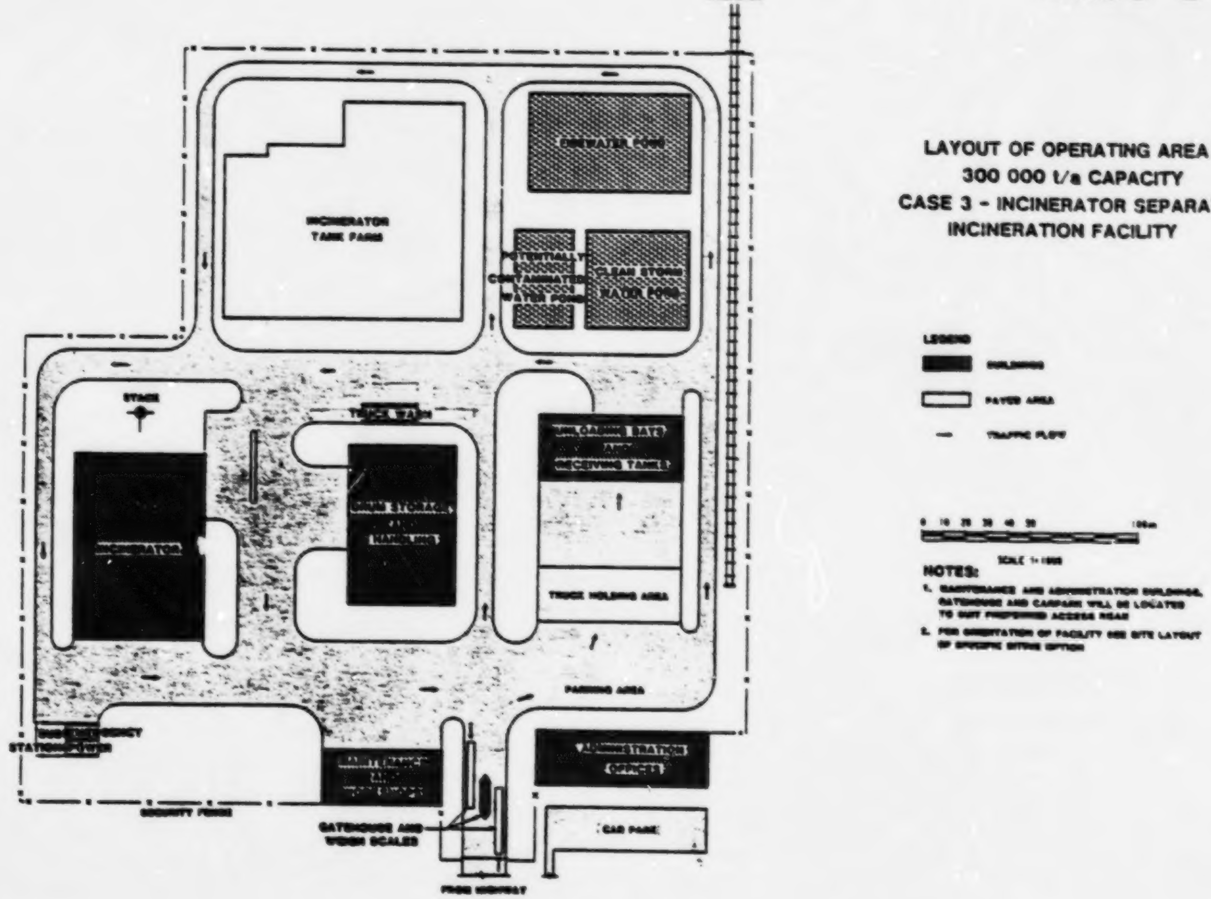


ELEVATION

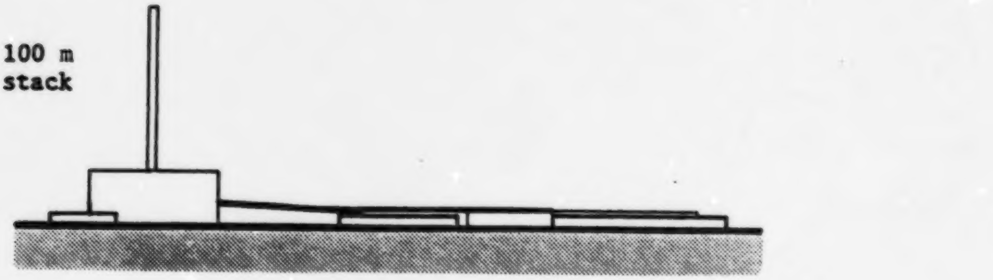
Source : Status Report: Facility Design: Monenco Limited, April 1985.

Figure 7

case 3


LAYOUT OF OPERATING AREA
300 000 t/a CAPACITY
CASE 3 - INCINERATOR SEPARATE
INCINERATION FACILITY
RAIL SPUR
FIREWATER POND
INCINERATOR
TANK FARM
POTENTIALLY
CONTAMINATED
WATER POND
CLEAN STORM
WATER POND
STACK
TRUCK WASH
INCINERATOR
DRUM STORAGE
AND
HANDLING
UNLOADING BAYS
AND
RECEIVING TANKS
TRUCK HOLDING AREA
PARKING AREA
STATION
ADMINISTRATION
OFFICES
SECURITY FENCE
GATEHOUSE AND
WEIGH SCALES
CAR PARK
FROM HIGHWAY
LEGEND
BUILDINGS
PAVED AREA
TRAFFIC FLOW
0 10 20 30 40 50 100m
NOTES:

LAYOUT

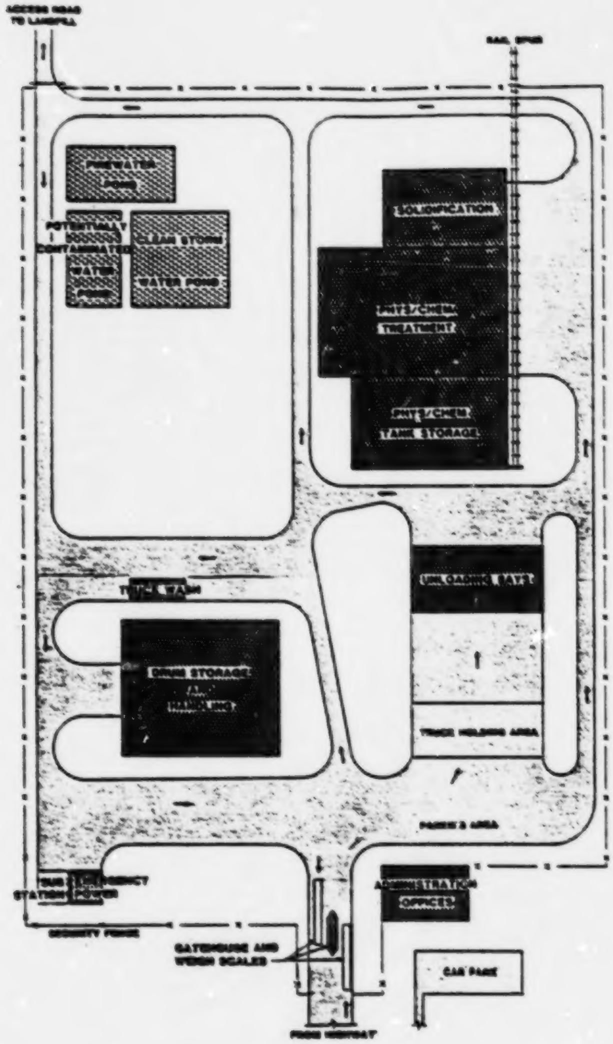


ELEVATION

Source : Status Report: Facility Design: Monenco Limited, April 1985.

Figure 8

case 3


ACCESS ROAD TO LANDFILL
RAIL SPUR
FIREWATER POND
POTENTIALLY CONTAMINATED WATER POND
CLEAN STORM WATER POND
SOLIDIFICATION
PHYS/CHEM TREATMENT
PHYS/CHEM TANK STORAGE
TRUCK WASH
UNLOADING BAYS
DRUM STORAGE AND HANDLING
TRUCK HOLDING AREA
PARKING AREA
FUEL STATION
EMERGENCY POWER
ADMINISTRATION OFFICES
SECURITY FENCE
GATEHOUSE AND WEIGH SCALES
CAR PARK
FROM HIGHWAY

LAYOUT OF OPERATING AREA
300 000 t/a CAPACITY
CASE 3 - INCINERATOR SEPARATE
PHYSICAL/CHEMICAL/LANDFILL FACILITY

LEGEND

■	BUILDINGS
▭	PAVED AREA
→	TRAFFIC FLOW

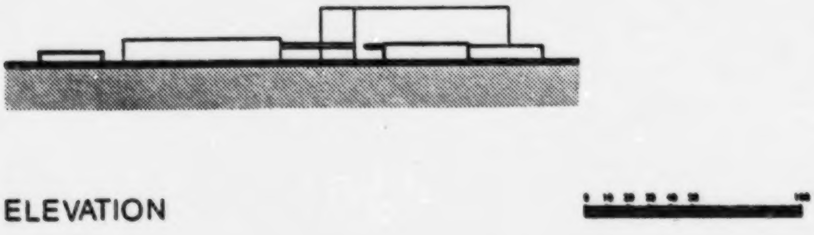
0 10 20 30 40 50 100m

SCALE 1:1000

NOTES:

1. ADMINISTRATION OFFICES, GATEHOUSE AND CARPARK WILL BE LOCATED TO SUIT PREFERRED ACCESS ROAD
2. FOR ORIENTATION OF FACILITY SEE SITE LAYOUT OF SPECIFIC SITING OPTION

LAYOUT


0 10 20 30 40 50 100

ELEVATION

Source: Status Report: Facility Design: Monenco Limited, April 1985.

SITE CHARACTER DESCRIPTIONS

LF-4N - Town of Milton

Size:
- 168 hectares.

Location:
- northwest corner of the intersection of Burloak Drive and Britannia Road.

Present Use:
- agricultural with some pockets of residential

Surroundings:
- a "rural" area with rural residential, agricultural and conservation areas nearby.

Vegetation:
- small wooded area on the site.
- predominantly field crops etc.

Landform/Drainage:
- poor topographic relief.
- drains to the south.
- only moderately well drained.

Built Form:
- some single family homes and barns.

General Visual Impression:
- a fairly exposed site in an area of relatively high scenic quality.
- the Rattlesnake Point and Mount Nemo areas of the Niagara Escarpment overlook the site as do several surrounding homes.

LF-4N

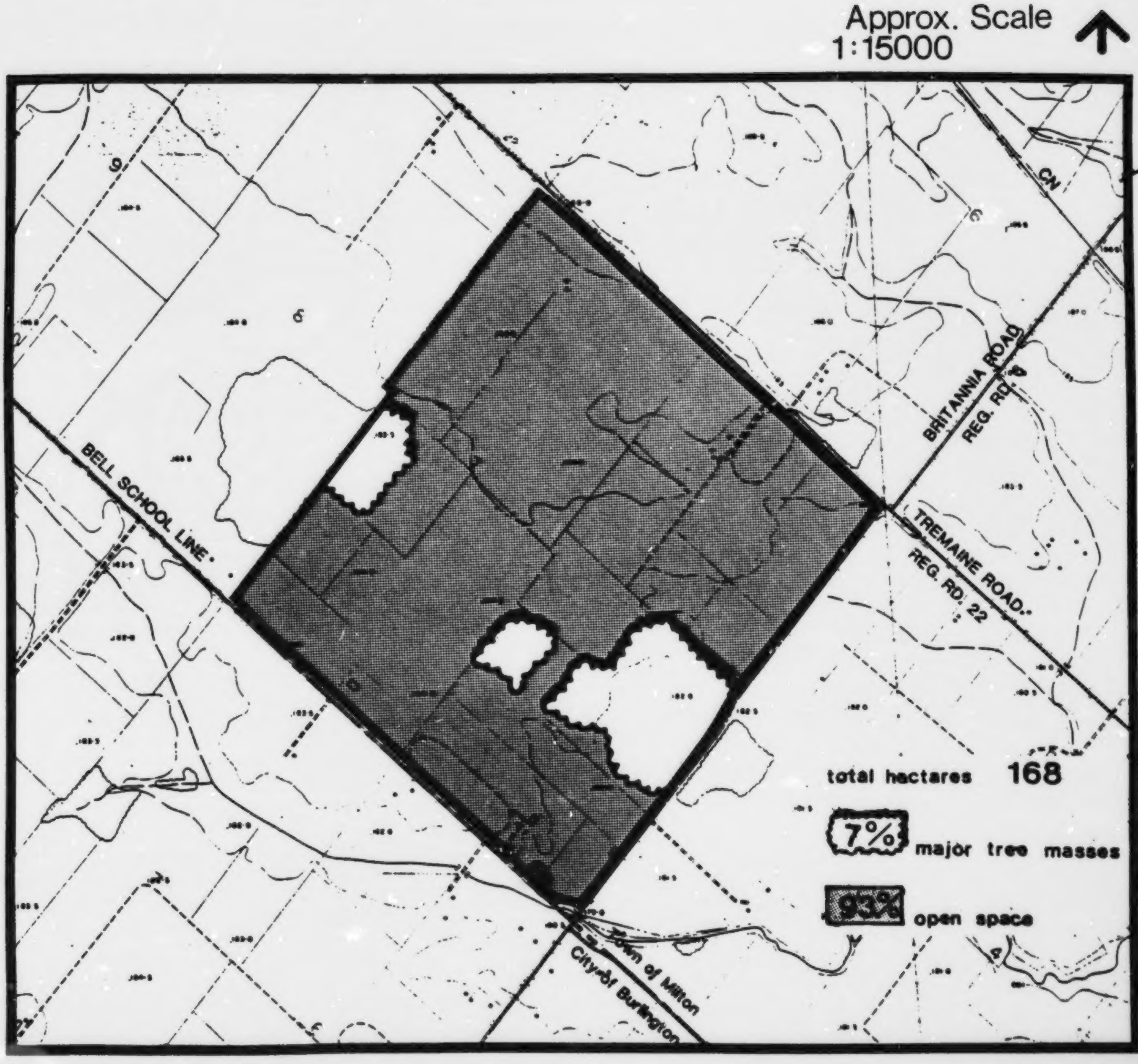
Figure 9 Existing Open Space

Legend

▨ Area of Open Space Void of Vegetation

☐ Existing Major Tree Masses

— Potential Aquisition Boundary


Approx. Scale
1:15000
9
6
6
CN
BRITANNIA ROAD
REG. RD. 6
BELL SCHOOL LINE
TREMAINE ROAD
REG. RD. 22
total hactares 168
7% major tree masses
93% open space
Town of Milton
City of Burlington

PI-1N - Town of Milton

Size:	- 195 hectares.
Location:	- on the southwest corner of the Britannia Road.
Present Use:	- agricultural with some minor rural residential along the roads.
Surroundings:	- agricultural, hazard lands and the Parkway Belt.
Vegetation:	- some mature woodlot masses, scrub growth and hedgerows along the roads. - crops on cultivated fields.
Landform/Drainage:	- flat to gently rolling, sloping gently to the south. - fairly well drained.
General Visual Impression:	- a rural area of a generally open and exposed nature. - some strong vegetative masses, edges and spatial definition. - Rattlesnake Point and Mount Nemo appear in the background to the west and south.

PI-1N

Figure 10 Existing Open Space

Legend

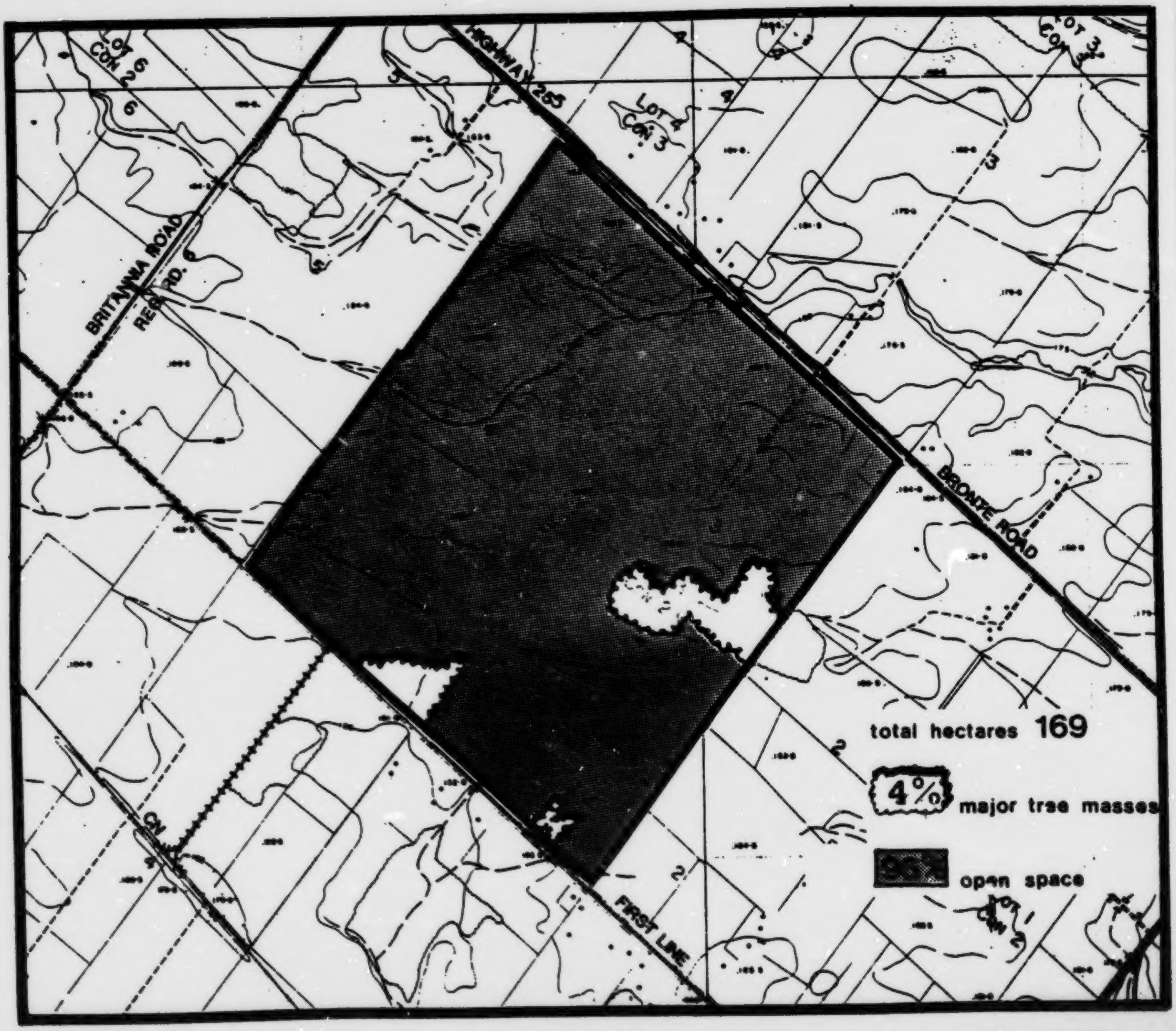
▨ Area of Open Space Void of Vegetation

Existing Major Tree Masses

— Potential Aquisition Boundary

Note : The site boundary shown for PI-1N illustrates the refined site boundary.

Approx. Scale 1:15000 ↑


HIGHWAY 25
LOT 6 CON 2
6
3
LOT 4 CON 3
4
LOT 3 CON 3
3
BRITANNIA ROAD
REG. RD. 6
BRONTE ROAD
2
CN
FIRST LINE
LOT 1 CON 2
total hectares 169
4% major tree masses
open space

PI-13N - Town of Milton

Size:	- 170 hectares.
Location:	- between the Fifth and Sixth Lines, south of Britannia Road West.
Present Use:	- agricultural with some minor residential along the roads.
Surroundings:	- agricultural with small pockets of rural residential.
Vegetation:	- no significant mature woodlots, but scrub and hedgerows along the roads.
Landform/Drainage:	- good topographic relief and good drainage. - gently sloping to the south.
General Visual Impression:	- a rural area of a generally open and exposed nature. - no substantial mature vegetative masses, strong edges or spatial structure. - the Niagara Escarpment is in the distant background to the southwest.

Figure 11 Existing Open Space

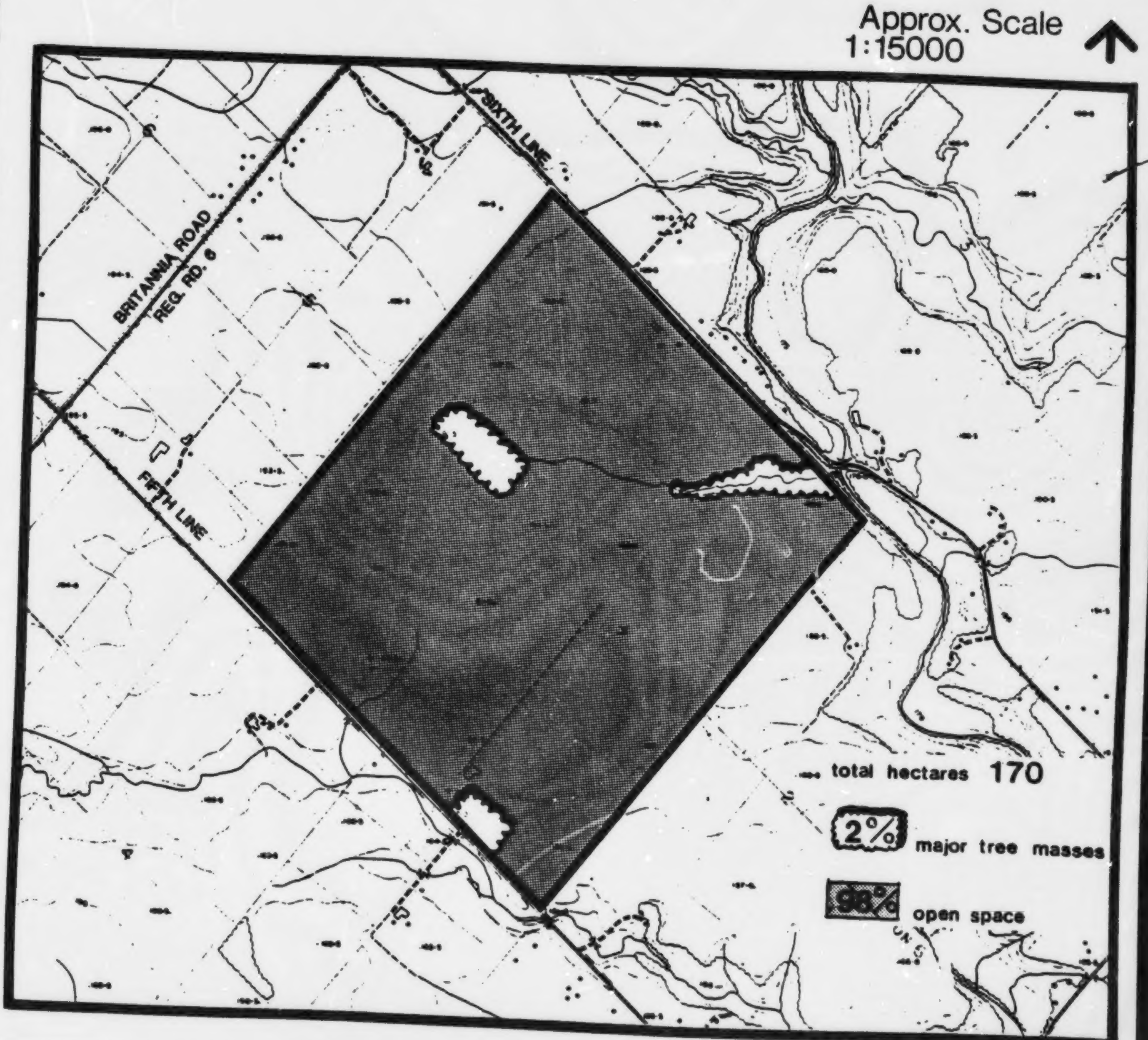
PI-13N

Legend

▨ Area of Open Space Void of Vegetation

▢ Existing Major Tree Masses

— Potential Aquisition Boundary


Approx. Scale
1:15000
SIXTH LINE
BRITANNIA ROAD
REG. RD. 6
FIFTH LINE
total hectares 170
2% major tree masses
98% open space

LF-3C - Township of West Lincoln

Size:	- 206 hectares.
Location:	- south of Elcho Road and east of Vaughan Road.
Present Use:	- agricultural
Surroundings:	- a rural area with a small number of rural residential pockets.
Vegetation:	- some mature wooded area on the site with miscellaneous scrub growth and hedgerows along road.
Landform/Drainage:	- poor topographic relief and poor drainage.
Built Form:	- single family homes and barns.
General Visual Impression:	- a rural area with some visual interest areas. - generally open on the south half and more vegetated on the north. - no outstanding visual or scenic features.

LF-3C

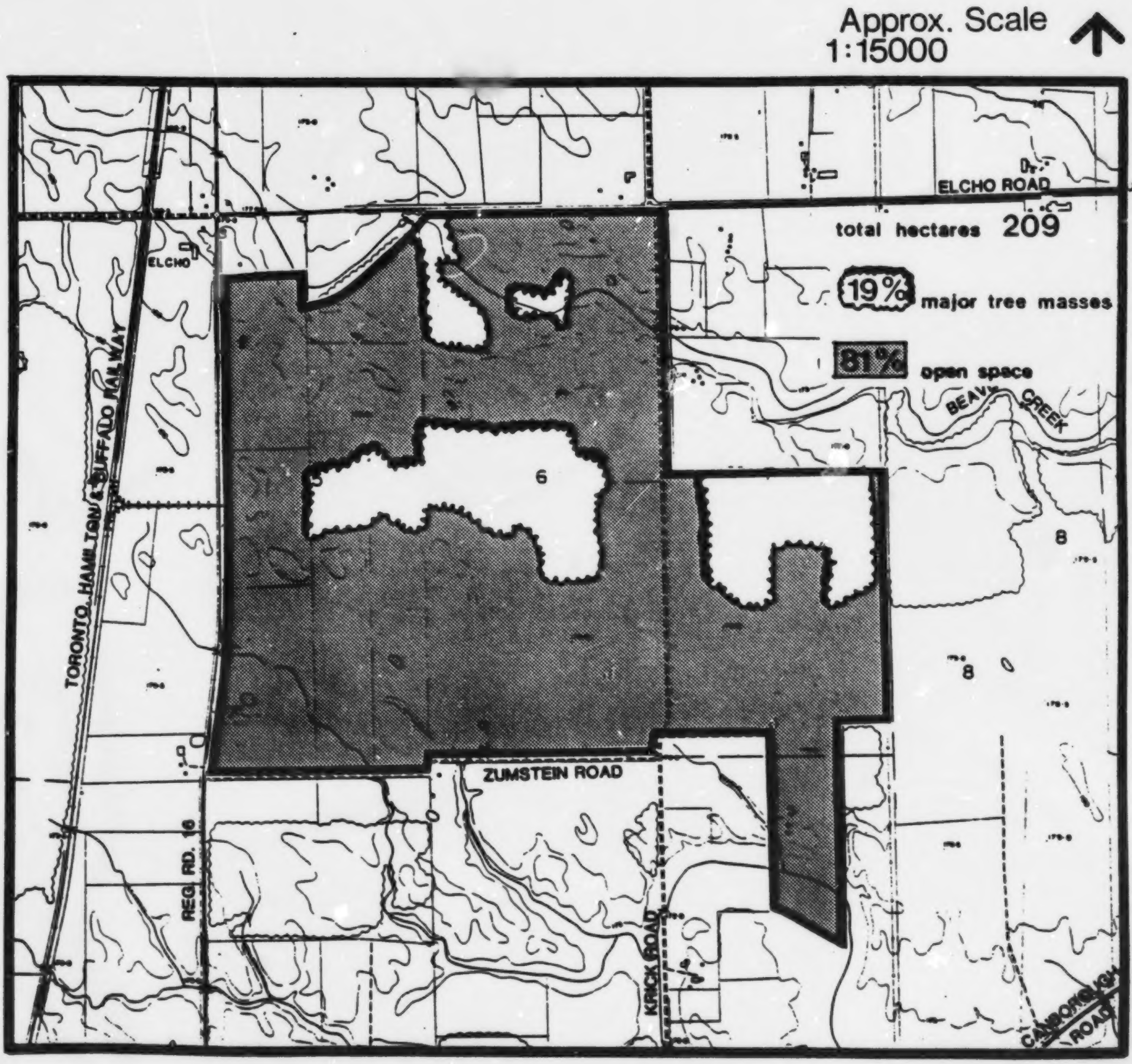
Figure 12 Existing Open Space

Legend

▨ Area of Open Space Void of Vegetation

◌ Existing Major Tree Masses

— Potential Aquisition Boundary


Approx. Scale
1:15000
ELCHO ROAD
ELCHO
total hectares 209
19% major tree masses
81% open space
BEAVER CREEK
TORONTO, HAMILTON & BUFFALO RAILWAY
6
8
8
ZUMSTEIN ROAD
REG. RD. 16
KRICK ROAD
CANBOROUGH ROAD

LF-9C - Township of West Lincoln

Size:	- 135 hectares.
Location:	- on the south side of Highway 20 east of Bismarck.
Present Use:	- agricultural and some single lot residential.
Surroundings:	- agricultural with some rural residential.
Vegetation:	- some mature wooded area on the site, with scrub growth and hedgerows along the roads.
Landform/Drainage:	- poor topographic relief and poor drainage.
Built Form:	- single family homes and barns.
General Visual Impression:	- a rural area with no significant unique scenic quality. - reasonably strong vegetative masses and spatial structure.

Figure 13 Existing Open Space

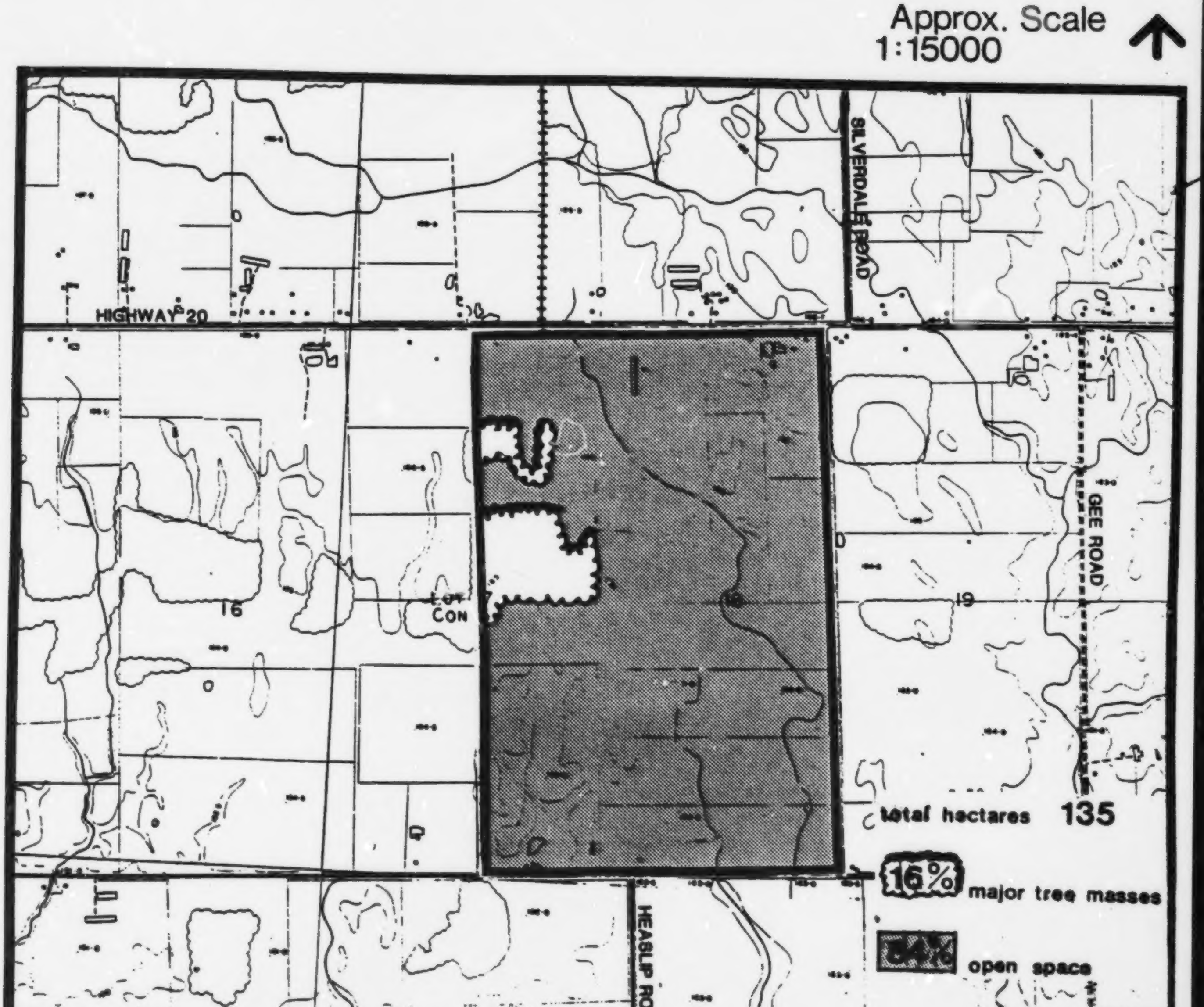
LF-9C

Legend

▨ Area of Open Space Void of Vegetation

▢ Existing Major Tree Masses

— Potential Aquisition Boundary


Approx. Scale
1:15000
HIGHWAY 20
SILVERDALE ROAD
GEE ROAD
HEASLIP ROAD
16
18
19
LOT
CON
total hectares 135
16% major tree masses
84% open space

LF-1E - City of Niagara Falls

Size:	- 135 hectares.
Location:	- south of Carl Road and west of Crowland Road.
Present Use:	- agricultural with some pockets of residential.
Surroundings:	- rural and agricultural lands
Vegetation:	- some large areas of mature woodlot and substantial, mature street trees along roads.
Landform/Drainage:	- little topographic relief and poor drainage.
Built Form:	- single family houses, some barns, commercial establishment nearby (auto wrecker), railway tracks adjacent to site on west side.
General Visual Impression:	- a rural area with no significant unique or scenic quality. - strong vegetative masses and spatial structure.

LF-1E

Figure 14 Existing Open Space

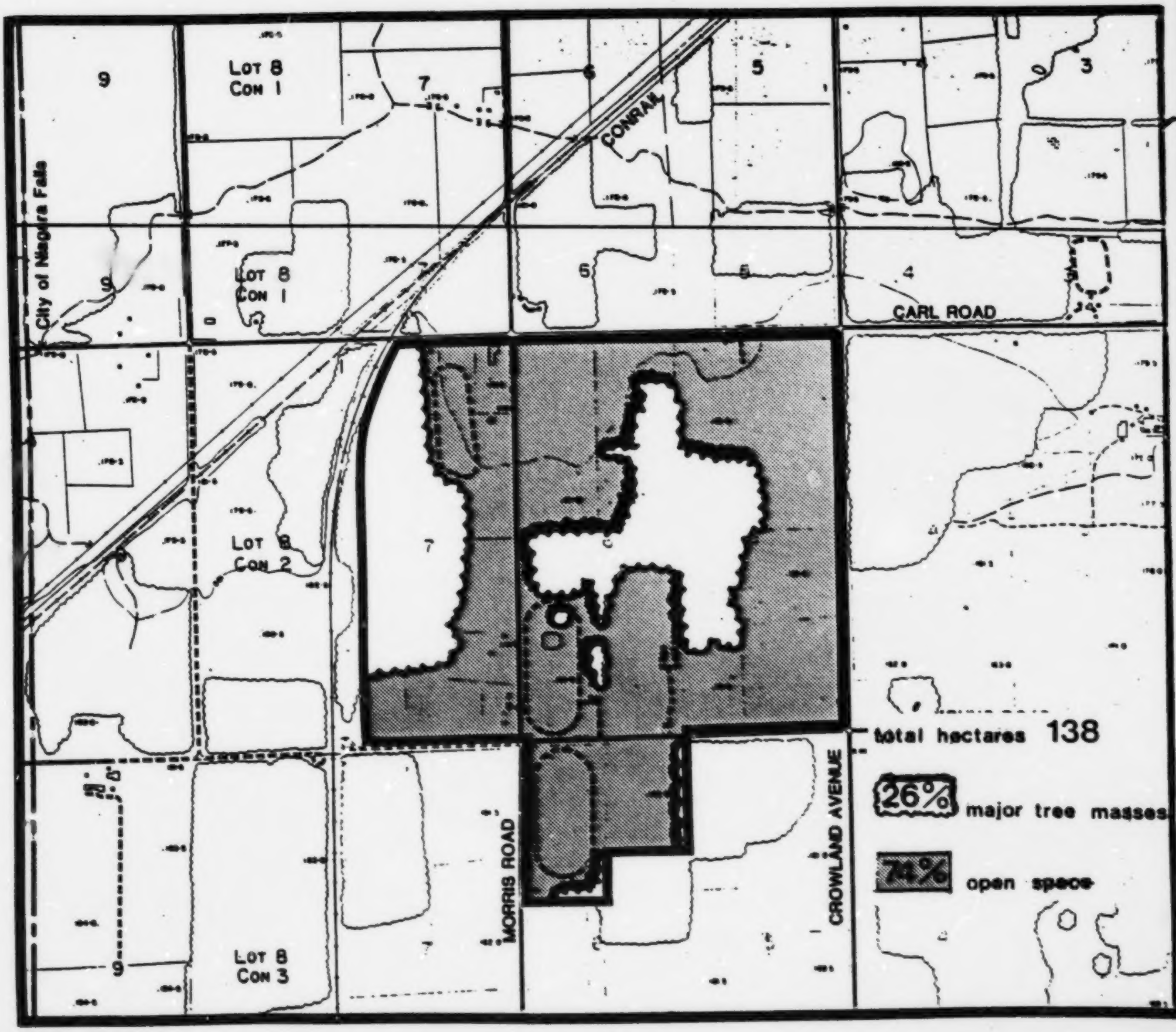
Legend

▨ Area of Open Space Void of Vegetation

Existing Major Tree Masses

— Potential Aquisition Boundary

Approx. Scale 1:15000 ↑


9
Lot 8
Con 1
7
6
5
3
Conrail
City of Niagara Falls
9
Lot 8
Con 1
6
5
4
Carl Road
7
Lot 8
Con 2
total hectares 138
26% major tree masses
74% open space
Morris Road
Crowland Avenue
9
Lot 8
Con 3
7

PI-27E - City of Niagara Falls

Size:	- 188 hectares.
Location:	- west of Montrose Road (Regional Road 98) and north of Bigger Road (Regional Road 47).
Present Use:	- agricultural but with proposed industrial designation. - some residential nearby.
Surroundings:	- adjacent industry to the north and west. - agricultural to the south.
Vegetation:	- substantial mature woodlots. - crops on cultivated fields
Landform/Drainage:	- poor topographic relief, slopes to the east and is poorly drained.
General Visual Impression:	- a "close-to-industry" image with open areas on the east, mature vegetative masses, edges and spatial structure on the west side. - the Niagara Falls Lookout Towers are in the background to the northeast.

PI-27E

Figure 15 Existing Open Space

Legend

▨ Area of Open Space Void of Vegetation

Existing Major Tree Masses

—·— Potential Aquisition Boundary

Approx. Scale
1:15000

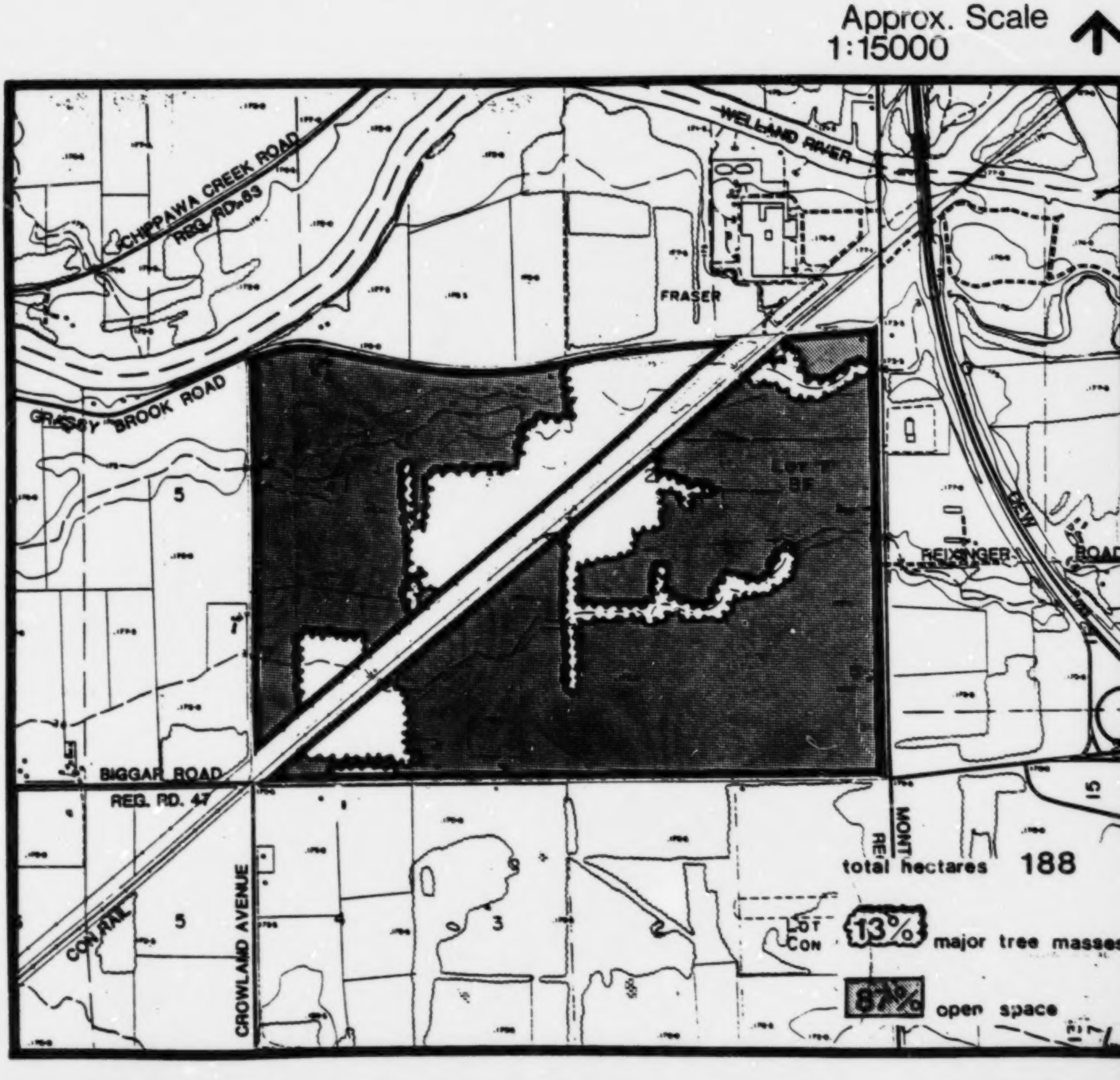

↑
CHIPPAWA CREEK ROAD
REG. RD. 63
WELLAND RIVER
FRASER
GRASSY BROOK ROAD
5
REIXINGER
ROAD
QEW
BIGGAR ROAD
REG. RD. 47
CON RAIL
5
CROWLAND AVENUE
3
MONT
RE
LOT
CON
total hectares 188
13% major tree masses
87% open space

TABLE 1 - AREA OF SITE OPEN SPACE vs MATURE WOODLOT

site	total area of site (hectares)	% of site open space	% of site vegetation
LF-4N	168 ha.	93	7
LF-3C	206 ha.	81	19
LF-9C	135 ha.	84	16
LF-1E	135 ha.	74	26
PI-13N	170 ha.	98	2
PI-1N	175 ha.	96	4
PI-27E	188 ha.	87	13

The assumptions described in this initial investigation were based on data provided by OWMC, drawings from and discussions with Monenco and site investigations and observations.

OWMC provided the information concerning the types of facility, their functions and general operation. Monenco provided the typical facility layouts and plans and description of facility operations as outlined in the Status Report, Facility design, dated 24th April, 1985 by Monenco Limited. Site investigations were carried out by E.D.A. staff members to document site visual character.

These findings and observations then formed the basis for the analysis section of the work.

SECTION C

ANALYSIS

SECTION C
ANALYSIS

INTRODUCTION

A series of detailed visual analyses were carried out to gain a more thorough understanding of the potential visual impact at each site. The analysis process undertaken involved the following tasks:

1. Establish general baseline visual conditions for each site by examining the site exposure.
2. Superimpose facility characteristics on site baseline conditions and document impacts. These include the following analyses:
    - special visual exposures
    - visual absorption potential
    - visual compatibility
    - intrusion on passing traffic
    - intrusion on surrounding households
3. Identify mitigation implications through the following analyses:
    - extent of mitigation
    - mitigation priorities

Each type of analysis was structured to produce relative findings.

ANALYSIS DESCRIPTION

Each of the analyses is described below:

Site Exposure

This first assessment does not attempt to predict impact, but is a measure of the site's degree of openness, as seen from particular, designated, ground level viewing points. It was assumed that views from the corners of each site would be most representative, since these are often stopping points for traffic or points of orientation where landmarks are often identified.

This analysis did not analyze the amount of vegetation to be removed during construction. The actual areas where vegetation could be preserved is identified later in the study under another analysis. While other consultants have assumed total site development, the visual analysis is unique in that it identifies on-side features which could potentially be retained as visual screens.

This analysis was carried out in the summer months when deciduous vegetation was in full leaf, and offering the maximum level of visual presence. The loss of leaves from vegetation during the late fall, winter and early spring seasons was not seen as a factor which would significantly alter the ranking of sites since any change would affect the sites equally. The sites to experience the least seasonal change in exposure would be those with the least vegetation. The technique used to calculate the site exposure utilized a system which identified the limit of visibility from each ground level viewing point. This area of exposure was calculated as a percentage of the total site area and then the four percentages were averaged to establish a relative average percentage of exposed area from all corners.

Figures (16, 17, 18, 19, 20, 21 and 22) illustrate the exposed view area from each corner viewing point. Table 2 summarizes the results of this analysis. Based on these figures, the sites were ranked in order of ground level visual exposure as follows:

Least exposed	1. PI-27E
	2. LF-1E
	3. LF-3C
	4. LF-4N
	5. PI-13N and PI-1N
Most exposed	6. LF-9C

The ranking established in this assessment was not used in the final ranking of factors since it did not assess the siting options with the facilities superimposed. This analysis established the baseline visual conditions.

As indicated on Table 2, site PI-27E is clearly the least exposed site with an average of less than 20% of its area visible from the four corners. Sites LF-1E and LF-3C were closely ranked at approximately 30% exposure each. Site LF-4N was then ranked behind at roughly 56% exposed area while PI-13N, PI-1N and LF-9C had an average of roughly 70% of their area exposed from the four corners.

TABLE 2 - SUMMARY OF SITE VISUAL EXPOSURE FROM GROUND LEVEL

site	% of exposed area from				average % of exposed
	point A	point B	point C	point D	area from all corners
LF-4N	59	72	68	24	56
LF-3C	55	21	25	22	31
LF-9C	71	39	84	83	69
LF-1E	25	33	28	-	29
PI-13N	65	79	60	-	68
PI-1N	78	72	74	47	68
PI-27E	13	23	2	34	18

Figure 16 Visual Exposure (General) of Site from Selected Viewpoints

LF-4N

Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

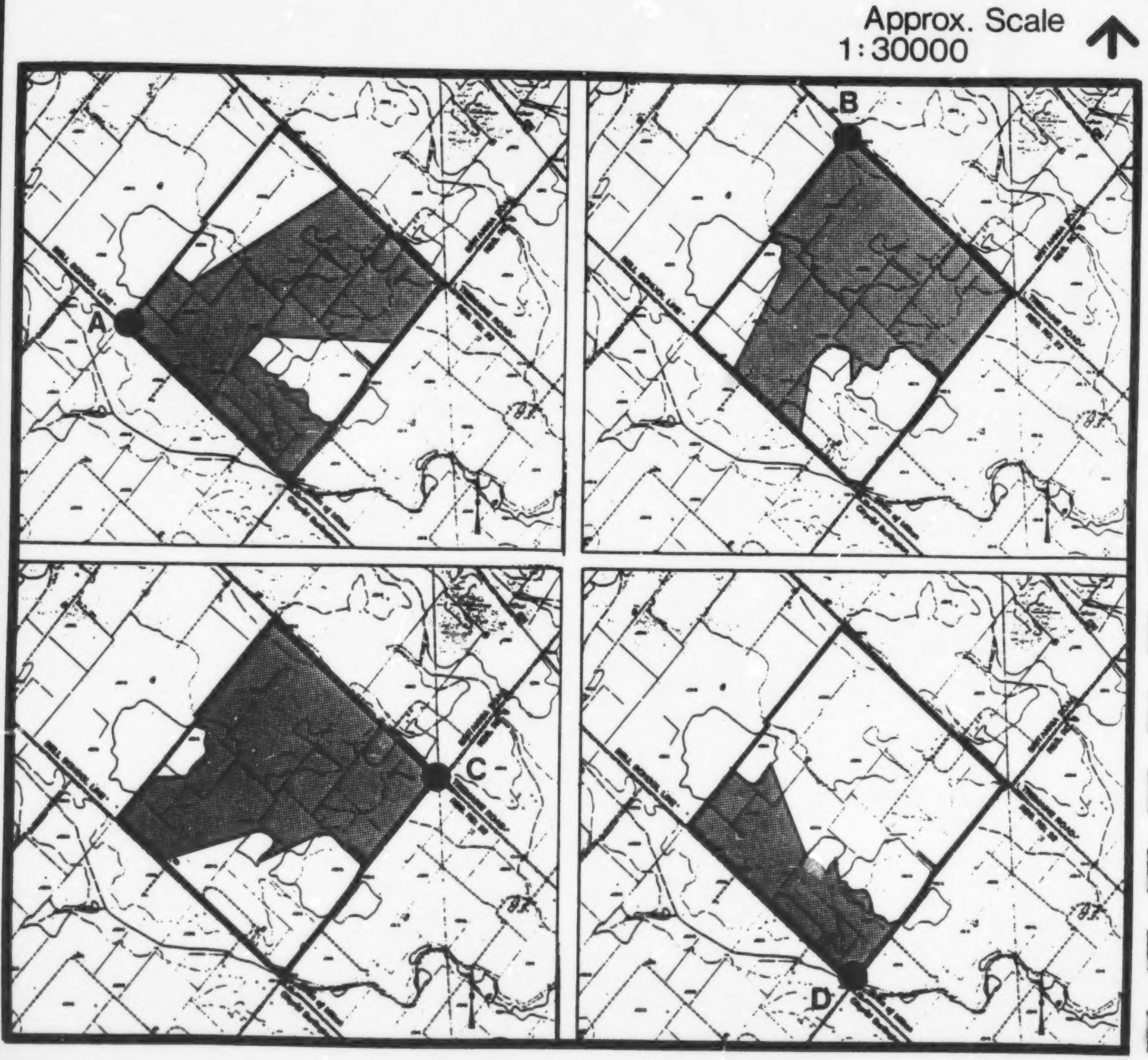

Approx. Scale
1:30000
A
B
C
D

Figure 17 Visual Exposure (General) of Site from Selected Viewpoints

Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

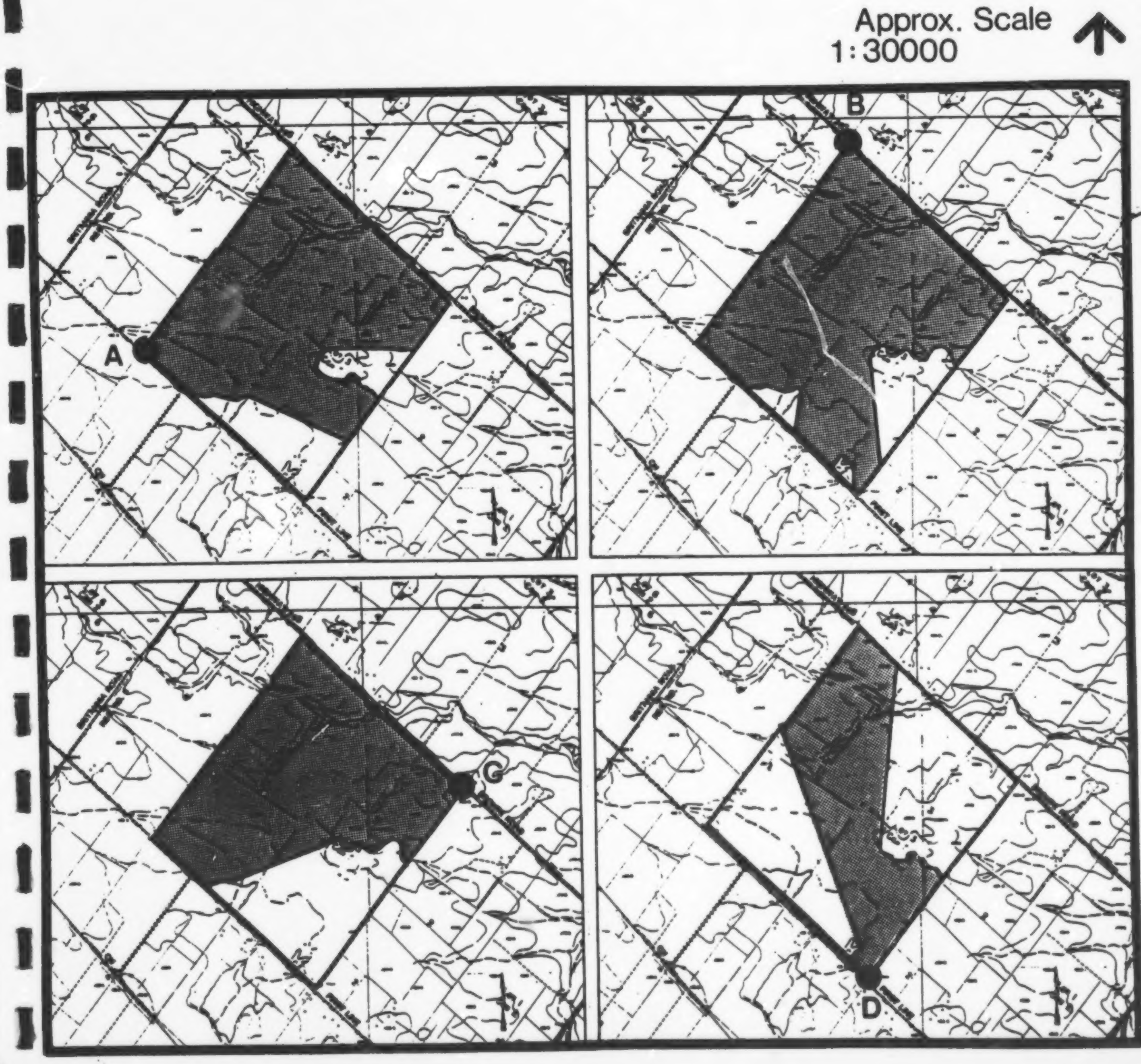

Approx. Scale
1:30000
A
B
C
D
FIRST LINE

Figure 18 Visual Exposure (General) of Site from Selected Viewpoints

PI-13N

Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

Approx. Scale 1:30000

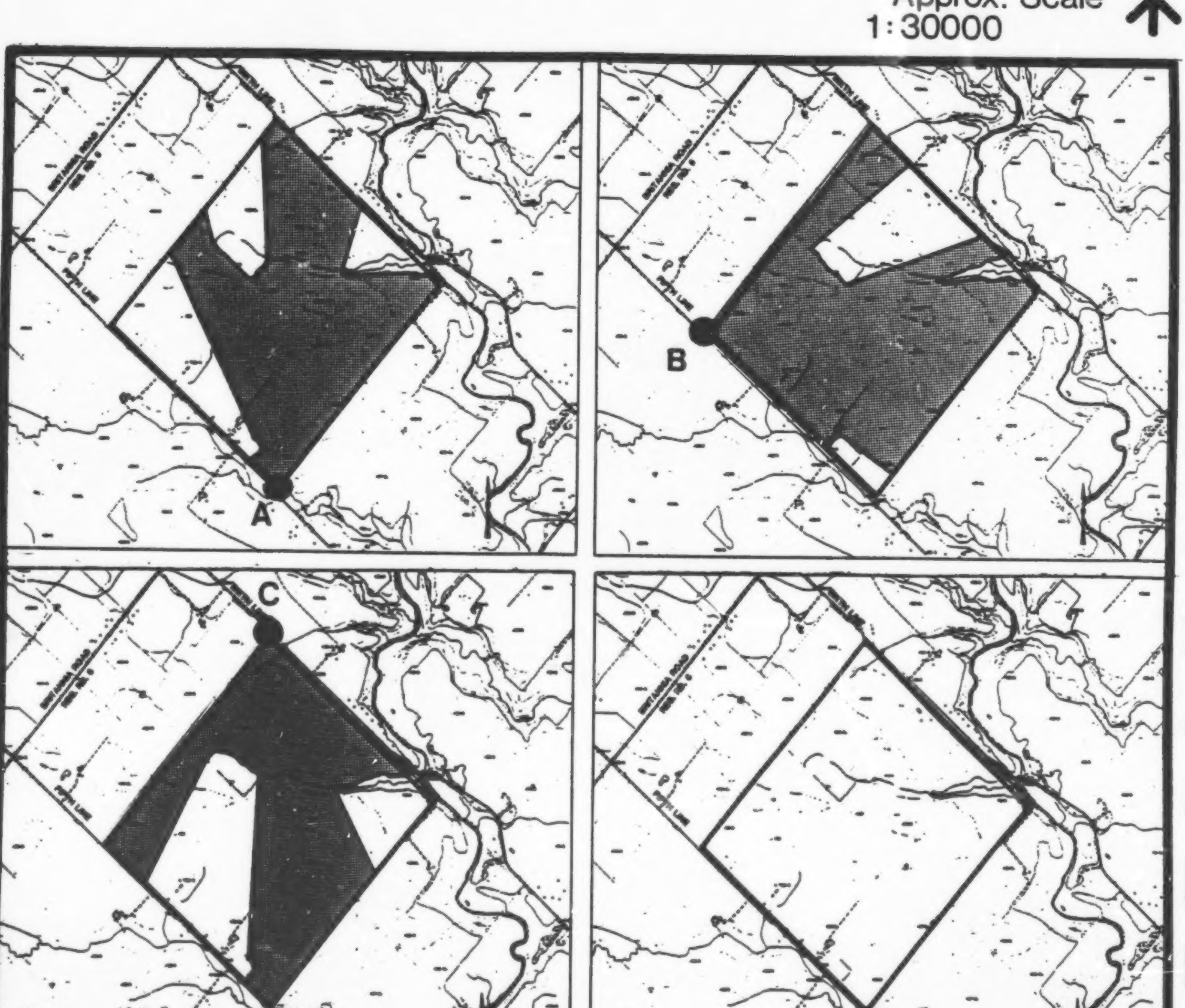


Figure 19 Visual Exposure (General) of Site from Selected Viewpoints

Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

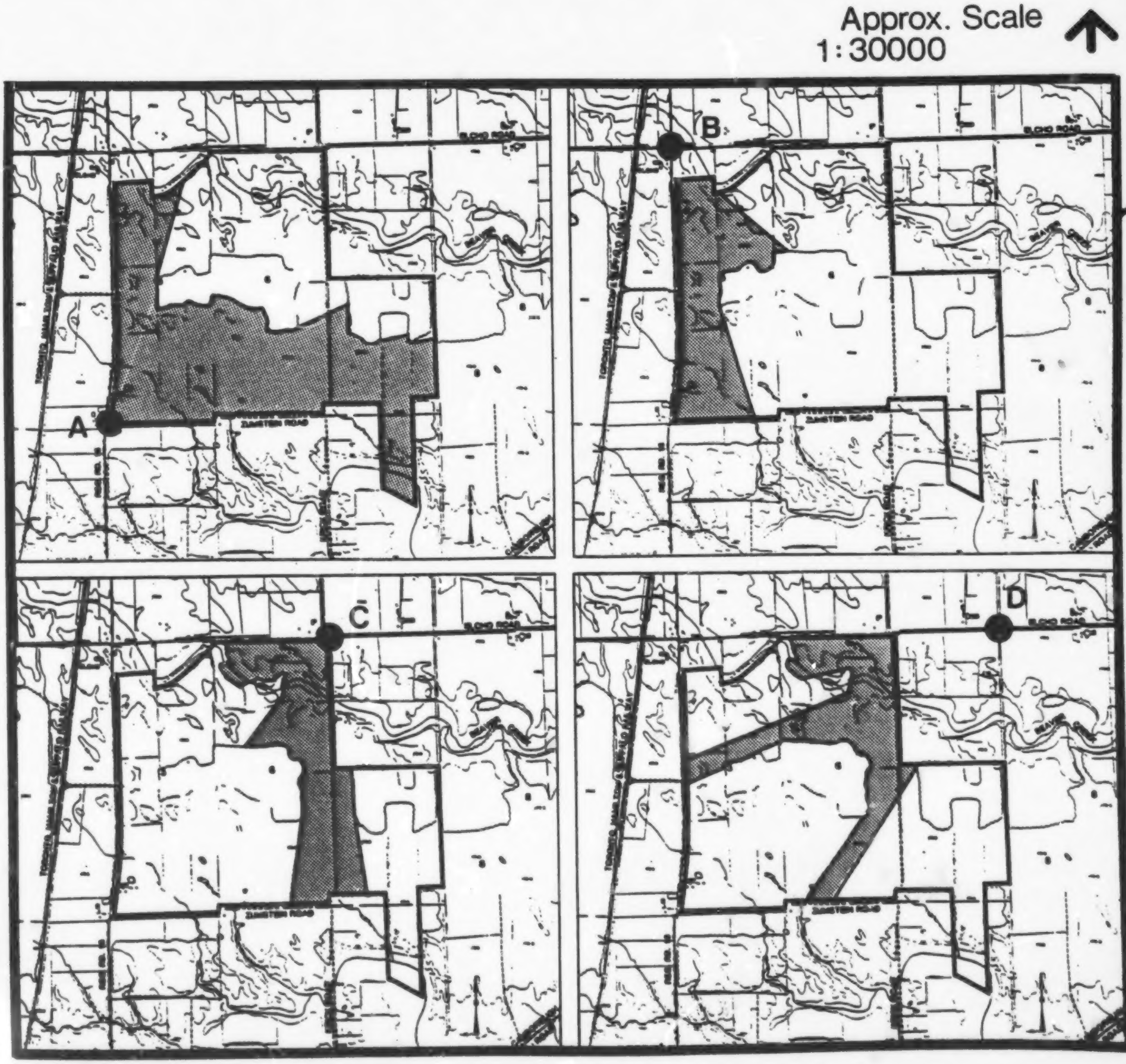

Approx. Scale
1:30000
A
B
C
D
ELCHO ROAD

Figure 20 Visual Exposure (General) of Site from Selected Viewpoints

LF-9C

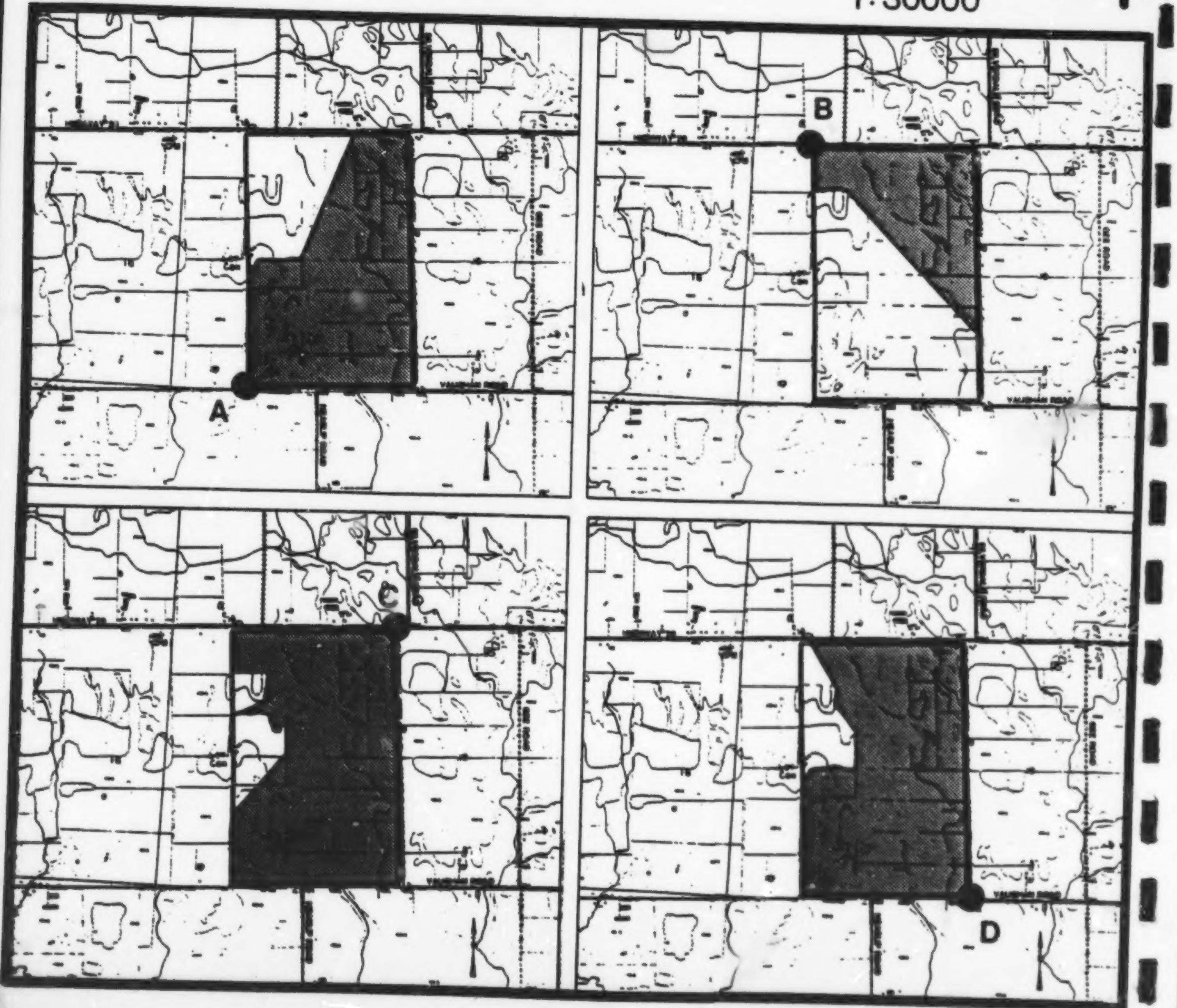
Legend

○ Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

Approx. Scale
1:30000



LF-1E

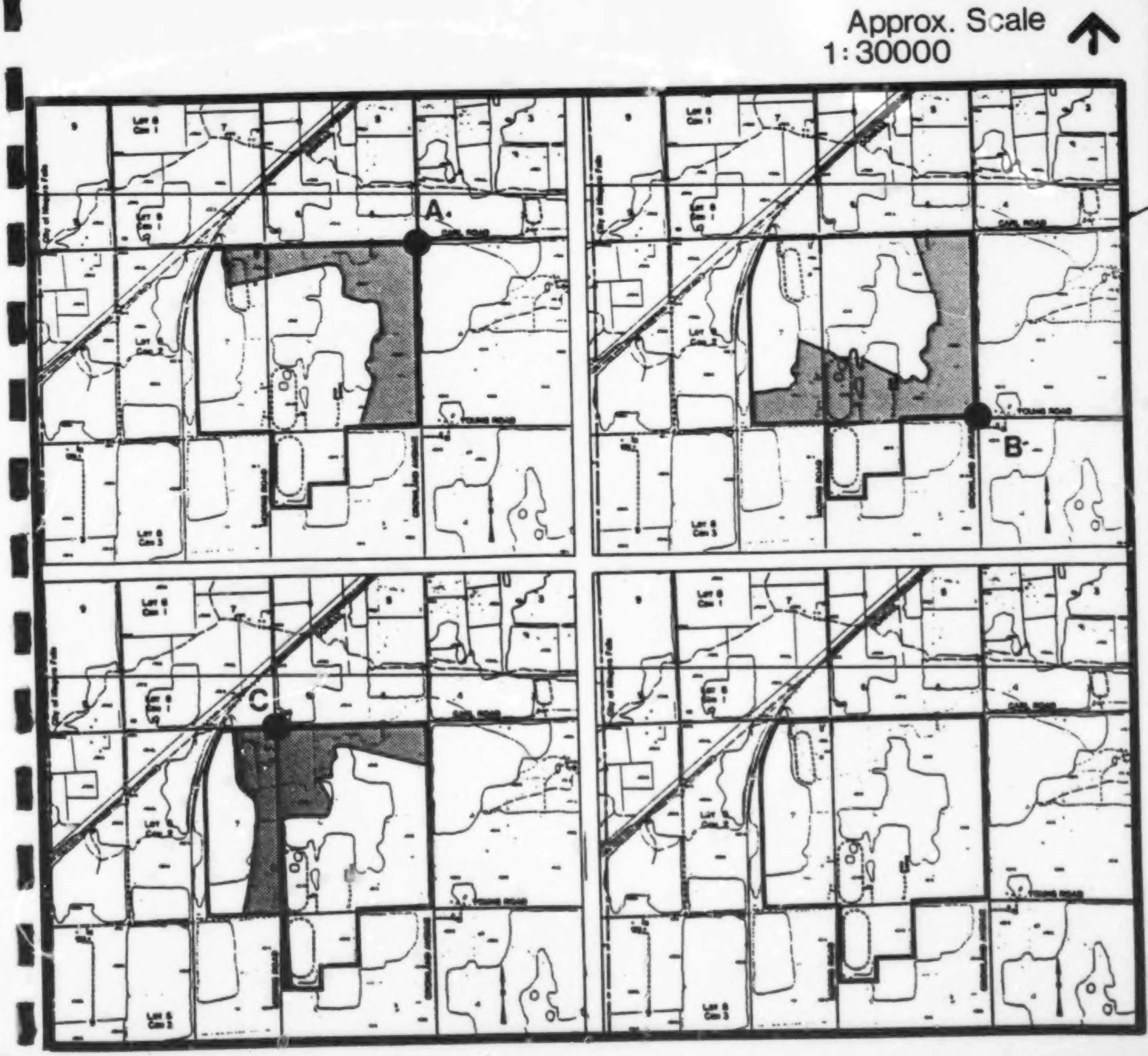
Figure 21 Visual Exposure (General) of Site from Selected Viewpoints

Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary


Approx. Scale
1:30000
A.
CARL ROAD
YOUNG ROAD
B.
C

PI-27E

Figure 22 Visual Exposure (General) of Site from Selected Viewpoints

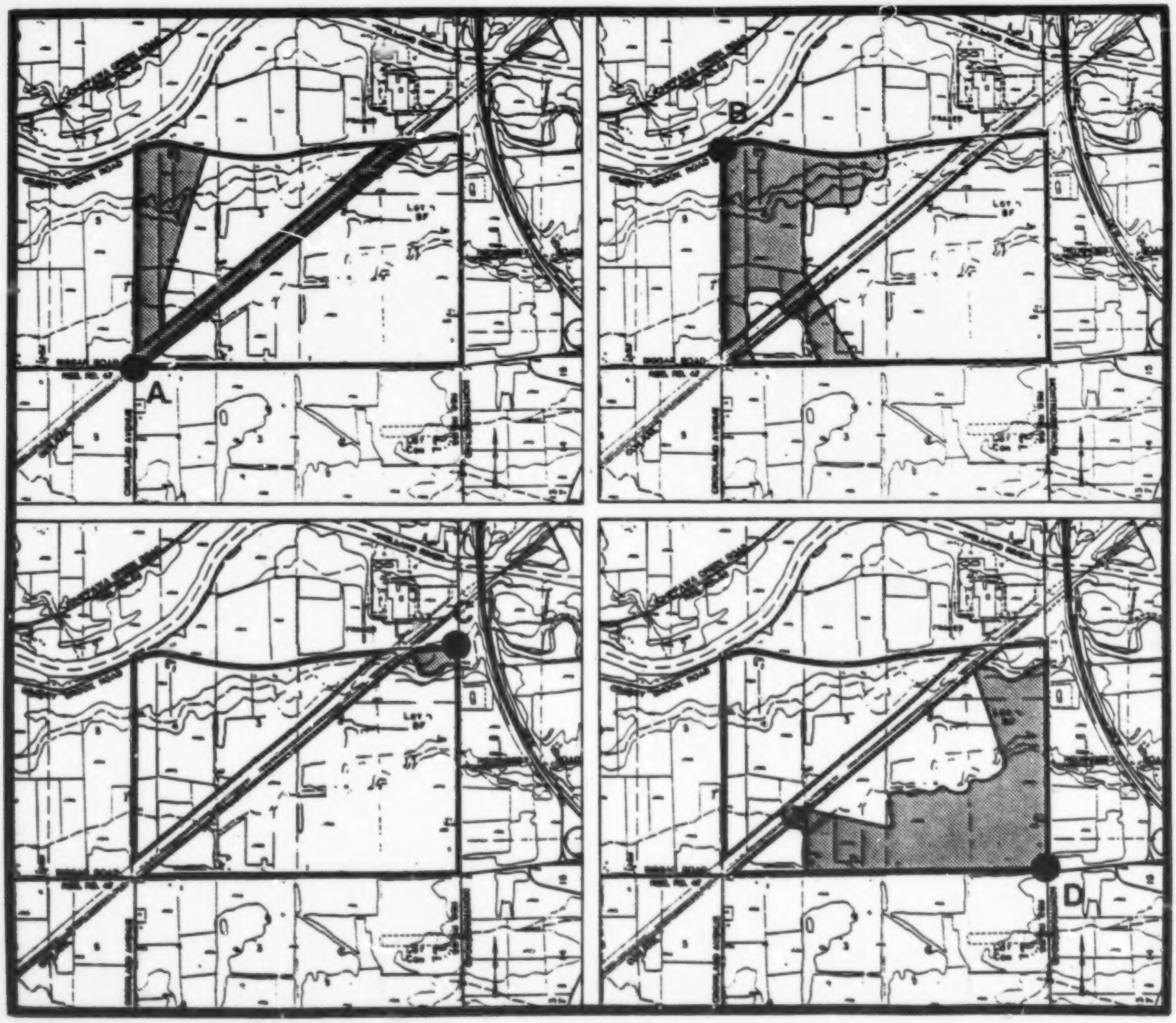
Legend

● Viewpoint

▨ Visual Exposure of Site from Viewpoint

— Potential Aquisition Boundary

Approx. Scale
1:30000



Special Visual Exposure
Each site was evaluated as to whether it was vulnerable to view from one or more unique viewing opportunities above normal groundlevel. The sites were studied and it was found that PI-27E and LF-1E were within view from the two Niagara Falls tourist viewing towers (i.e. the Skylon and Minolta Towers). Figure 23 illustrates the location of these sites in relation to the Towers.

Sites LF-4N, PI-1N and PI-13N were within view from the Mount Nemo and Rattlesnake Point areas of the Niagara Escarpment. Figures 24 and 25 illustrate the location of these sites in relation to the escarpment.

Sites LF-9C and LF-3C were not visible from any special or unique viewing points. The sites that were within view from any of these vantage points were initially seen as having potential visual impact while those sites which were not were considered as having no visual impact on special viewing points.

The next level of investigation attempted to further refine these initial findings. The height of the viewing points and the distance were measured to define the relative amount of impact. Table 3 - Special Exposure Factors, summarizes the elevation of the special vantage point above the site elevation and the distance from the vantage point to the site.

In the case of the Niagara sites (LF-1E and PI-27E), the main focus of view is predominantly toward the Falls themselves to the east rather than the rural and urban areas to the southwest where the proposed sites are located. In addition, other industrial uses lie within the views from the towers while these sites themselves are reasonably well screened from these vantage points. It was therefore felt that even though the sites could be seen from the towers, the views were not severely impacted.

In the case of the Milton area, the candidate sites (LF-4N,PI-1N and PI-13N) are located directly in the primary scope of view from designated viewing points on the escarpment and would therefore have greater impact than the Niagara sites.

Other considerations with the Milton sites involve the inclusion of other urbanizing areas in the town itself which also are seen from these viewing points. As well, site LF-4N would not include an incinerator, but would house landfill or the landfill and phys/chem plant. However, due to its proximity to the viewing points, the exposure was still greatest.

This analysis made the basic assumption that the greater the exposure of the site from the viewing point, the greater the potential visual impact.

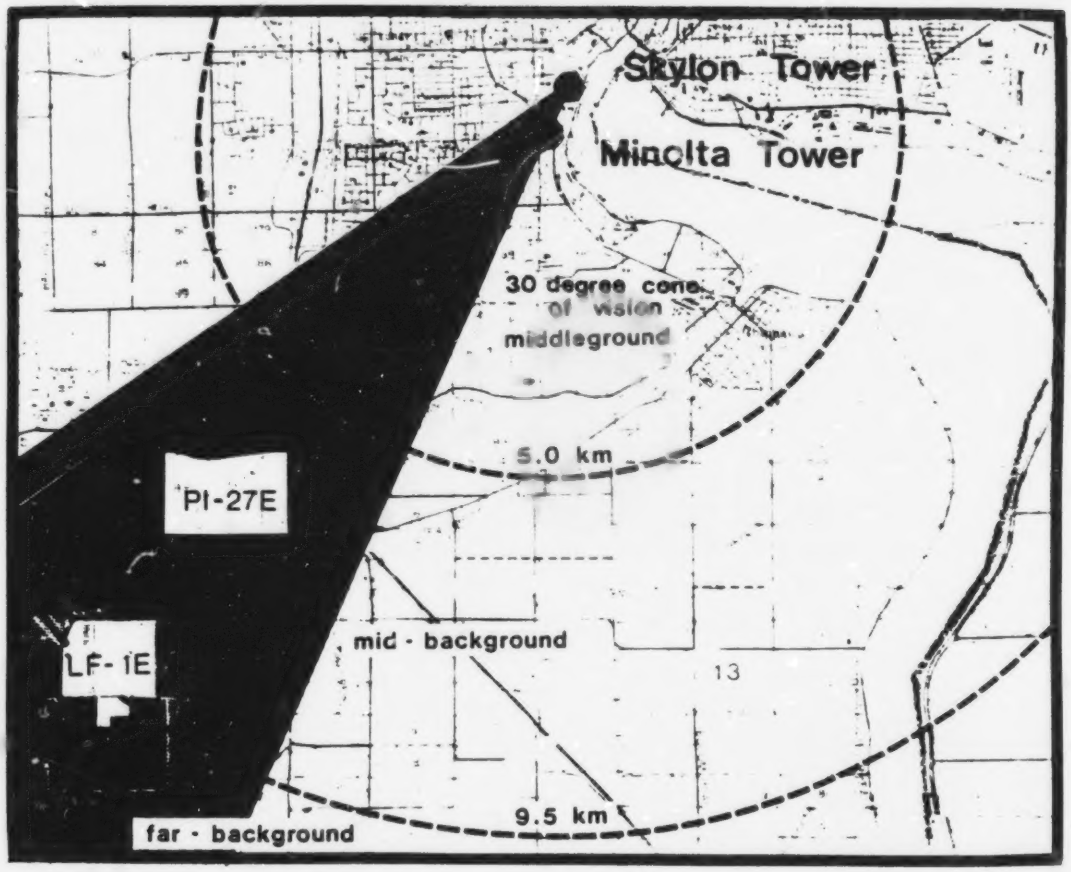

Skylon Tower
Minolta Tower
30 degree cone of vision
middleground
5.0 km
PI-27E
LF-1E
mid - background
13
9.5 km
far - background

Figure 23 Visual Exposure (Special) of Site from Special Vantage Points

Legend

● Special Vantage Point

◀ Cone of Vision

- - - Distance from Observer at Special Vantage Point

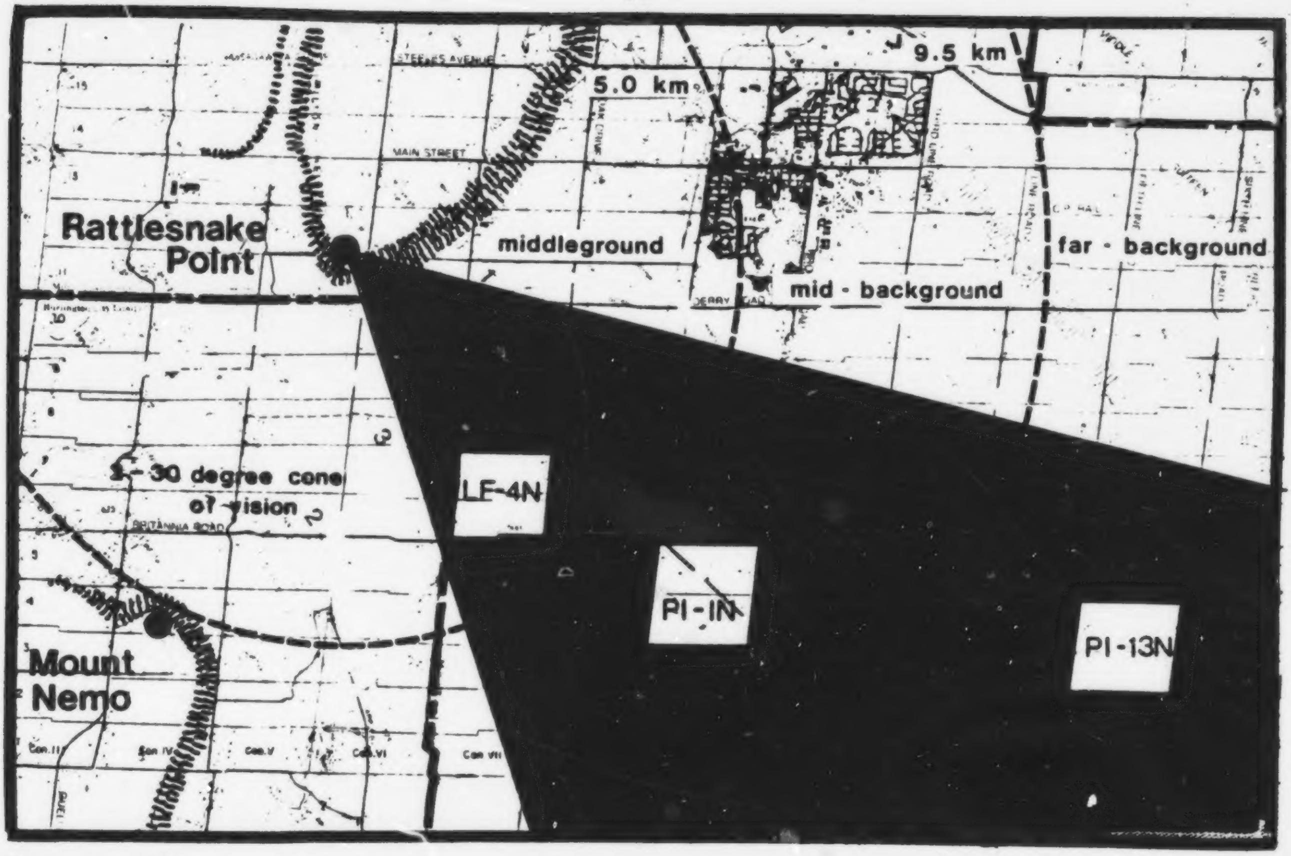

9.5 km
5.0 km
STEELES AVENUE
MAIN STREET
Rattlesnake Point
middleground
mid - background
far - background
DERRY ROAD
BRITANNIA ROAD
2 - 30 degree cone of vision
LF-4N
PI-1N
PI-13N
Mount Nemo
Con.V
Con.VI

Figure 24

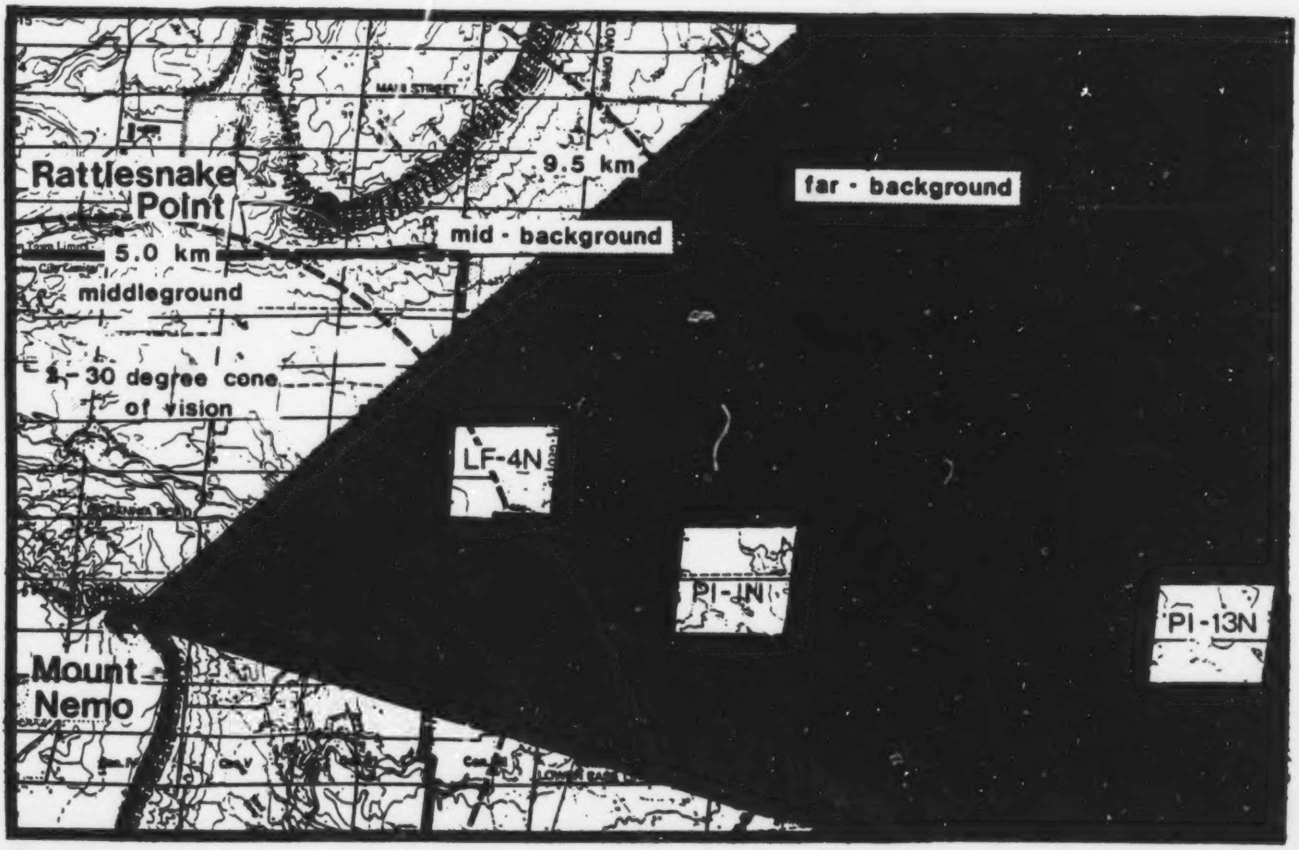

MAIN STREET
Rattlesnake Point
9.5 km
far - background
mid - background
5.0 km
middleground
2 - 30 degree cone of vision
LF-4N
PI-1N
PI-13N
Mount Nemo
Con.V
LOWER BASE LINE

Figure 25

TABLE 3 - SPECIAL VISUAL EXPOSURE FACTORS - ELEVATION AND DISTANCE

site	site exposed from 'special' vantage point	elevation of 'special' vantage point above average site elevation	distance of site from 'special' vantage point to centre of site
LF-4N	• views from top of		
	i/ Rattlesnake Point	123 m	3.8 km (middleground)
	ii/ Mount Nemo	92 m	4.8 km (middleground)
	• views from other areas along the Niagara Escarpment		
LF-3C	• no 'special' vantage points	N/A	N/A
LF-9C	• no 'special' vantage points	N/A	N/A
[illegible]	• views from top of		
	i/ Minolta Tower, Niagara Falls	98 m	8.6 km (background)
	ii/ Skyline Tower, Niagara Falls	154 m	9.3 km (background)
PI-13N	• views from top of		
	i/ Rattlesnake Point	113 m	11.5 km (far background)
	ii/ Mount Nemo	82 m	12.5 km (far background)
	• views from other areas along the Niagara Escarpment		
[illegible]	• views from top of		
	i/ Rattlesnake Point	123 m	6.5 km (background)
	ii/ Mount Nemo	92 m	6.7 km (background)
	• views from other areas along the Niagara Escarpment		
PI-27E	• views from top of		
	i/ Minolta Tower, Niagara Falls	102 m	6.3 Km (background)
	ii/ Skyline Tower, Niagara Falls	158 m	7.0 km (background)

Factors measured to arrive at the ranking of sites for this analysis were:

1. the presence of the site in the primary scope of view.
2. the distance from the viewing point
3. visual character from viewing point

The results of this analysis are summarized as follows:

Preliminary Assessment by Site

Least exposed	1.	LF-9C	- not visible from special viewing point.
		LF-3C	- not visible from special viewing point.
	2.	LF-1E	- visible from viewing point but not in primary scope of view and located in background area.
	3.	PI-27E	- closer than LF-1E to viewing point, but not in primary scope of view and also close to other industrial images.
	4.	PI-13N	- within primary scope of view but located well into background area.
	5.	PI-1N	- within primary scope of view within a rural background area.
Most exposed	6.	LF-4N	- closer to viewing point than PI-1N and located in rural setting.

The siting options were then ranked by combining the individual ranks of the sites to produce the following ranking:

	Rank	**Siting Option**	**Case**
Least exposed	1	LF-9C/LF-3C	1
	2	LF-1E	1
	3	LF-1E and PI-27E	2 and 3
	4	LF-4N and PI-13N	2 and 3
Most exposed	5	LF-4N and PI-1N	2 and 3

This ranking clearly identified sites LF-9C and LF-3C as having no impact on designated viewing points. The other sites were visible from their respective viewing locations. In the consideration of Cases 2 and 3 for LF-4N and PI-1N, no distinction was made between these at this level of the investigations.

Visual Absorption Potential

The visual absorption analysis utilized a predictive technique that superimposed the proposed facility onto each site. The plant location on each site was determined by the facility design consultants (Monenco).

The type of facility on each site and its setback from property boundaries determined the amount of major vegetation masses that could be preserved. For the purposes of this analysis, it was assumed that existing vegetation that would not be removed during construction or landfill operations, would be maintained to provide visual screening.

The amount of vegetation removed during construction and operations will depend on the type of facility proposed for the site. The following assumptions were made in this regard:

Case 1 - all major tree masses removed except where located within 50 m. setback from property acquisition boundary

Case 2 - all major tree masses removed from landfill site except where located within 50 m. setback from property acquisition boundary
- major tree masses would remain except where located within facility development area

Case 3 - all major tree masses removed from phys/chem plant and landfill site except where located within 50 m. setback from property acquisition boundary
- major tree masses would remain on incinerator site except where located within facility development area.

The nature of visual absorption involves various factors including the nature of the proposed facility, the presence and nature of foreground screening as well as backgrounds. Although background is a determinant in identifying visual absorption potential, it was found in this case, it was a more difficult factor to quantify in a consistent manner and was not used.

The visual absorption analysis for this study made use of data regarding the foreground screening potential of each facility site. The length of each site boundary that would be screened by existing vegetative masses both by the edge and within the site was measured and calculated as a percentage of the total length of boundary. This figure was used as the method of ranking the effectiveness of the existing landscape to "absorb" the proposed facility. Table 4 summarizes the results of this assessment for each site and case.

Based on the extent of existing vegetative screening available on a per site basis, the results were combined to calculate the aggregate screening for the siting options. Table 5 summarizes the results for cases 2 and 3 (i.e. where more than one site is involved in the siting option).

Based on these totals, the following rankings were identified for visual absorption potential:

	Rank	Siting Option	Case
Maximum visual absorption potential	1.	LF-1E and PI-27E	2 and 3
	2.	LF-1E	1
	3.	LF-3C	1
	4.	LF-9C	1
	5.	LF-4N and PI-1N	3
	6.	LF-4N and PI-1N	2
Minimum visual absorption potential	7.	LF-4N and PI-13N	3
	8.	LF-4N and PI-13N	2

The data supporting this ranking, on Table 5, identifies siting options LF-1E/PI-27E, Cases 2 and 3 as having the greatest arcunt (50%) of existing screening available on the sites. Siting option LF-1E for all cases, also had close to 50% of its boundaries providing visual screening. The other siting options had substantially less visual screening available on their sites and hence less visual absorption potential.

TABLE 4 - SCREENING POTENTIAL OF EXISTING VEGETATION

site	total length* of boundary around entire site (potential boundary acquisition)	length of* boundary with existing vegetation	screening potential % of external boundary vegetated	additional* length of boundary affected by tree masses within site	screening potential % of external boundary with screening(total)
LF-4N (case 2)	5100 m	600 m	12%	0 m	12%
LF-4N (case 3)	5100 m	600 m	12%	0 m	12%
LF-3C (case 1)	7550 m	1450 m	19%	0 m	19%
LF-9C (case 1)	4600 m	650 m	14%	0 m	14%
LF-1E (case 1)	5220 m	2500 m	48%	0 m	48%
LF-1E (case 2)	5220 m	2500 m	48%	0 m	48%
LF-1E (case 3)	5220 m	2500 m	48%	0 m	48%
PI-13N (case 2)	5100 m	0 m	0%	50 m	1%
PI-13N (case 3)	5100 m	0 m	0%	175 m	3%
PI-1N (case 2)	5100 m	350 m	7%	200 m	11%
PI-1N (case 3)	5100 m	350 m	7%	250 m	12%
PI-27E (case 2)	5600 m	700 m	13%	2325 m	54%
PI-27E (case 3)	5600 m	700 m	13%	2325 m	54%

*NOTE: Lengths of boundary acquisition lines and lengths of existing vegetation masses were scaled from 1:10000 maps of each site provided by OWMC.

TABLE 5 - AGGREGATE SCREENING POTENTIAL FOR CASES 2 AND 3

site	total length of boundaries around both sides	additional length of boundary affected by tree masses within site + length of boundary with existing vegetation	buffering potential combined % of external boundary vegetation for both sites
LF-1E & PI-27E (case 2)	10820 m	5525 m	51%
LF-1E & PI-27E (case 3)	10820 m	5525 m	51%
LF-4N & PI-1N (case 2)	10200 m	1150 m	11%
LF-4N & PI-1N (case 3)	10200 m	1200 m	12%
LF-4N & PI-13N (case 2)	10200 m	650 m	6%
LF-4N & PI-13N (case 3)	10200 m	775 m	8%

Visual Compatibility

This assessment attempted to predict the visual compatibility of the proposed facility with surrounding land uses.

In order to identify the degree of visual compatibility, the viewshed boundary was plotted for each case. In this analysis viewshed boundary was defined as the areas within which views to the site are possible. This area was identified through analysis of topographic mapping, aerial photographs and field checking.

In addition, the surrounding land uses and current zoning were plotted. These areas were field checked as to building types, development patterns and type of human activity.

The viewsheds were outlined and land uses plotted. The proposed facilities were considered as heavy industrial uses with major visually dominant elements. These facilities would be most compatible when surrounded by other, similar scaled facilities and land uses. The facilities would be least compatible with specially designated environmental preservation areas and rural agricultural land uses.

Figures 26, 27, 28, 29, 30, 31,and 32 illustrate the facility location, the approximate viewshed boundary and the surrounding land uses for each site. Table 6 summarizes the land use, development patterns and visual character of the area within the viewshed boundary.

Each site was assessed as to its visibility from the surrounding land uses. The location of the facility on each site did not play a significant role in this assessment since only general visual conditions were considered.

The interpretation of the findings identifies three basic categories of siting options and surrounding land uses. These are:

- presently rural with industrial development nearby and proposed within the viewshed boundary (LF-1E and LF-1E/PI-27E)
- presently rural agricultural with no significant proposed changes (LF-3C and LF-9C)
- presently rural with substantial designated preservation area within the viewshed boundary (LF-4N/PI-1N and LF-4N/PI-13N)

The only siting options which were deemed compatible therefore, were LF-1E and LF-1E/PI-27E. Option LF-1E was somewhat more compatible since it was closer to the adjacent industrial uses. The other siting options were not considered visually compatible. However, when ranking these siting options, it was considered that siting options LF-4N/PI-1N and LF-4N/PI-13N were ranked least compatible due to the presence of views from the Niagara Escarpment.

The resulting ranking is summarized below:

	Rank	Siting Option	Case
Most visually	1	LF-1E	1
compatible	2	LF-1E and PI-27E	2 and 3
	3	LF-3C	1
	4	LF-9C	1
Least visually	5	LF-4N and PI-1N	2 and 3
compatible	6	LF-4N and PI-13N	2 and 3

TABLE 6 - AREA LAND USE, BUILDING TYPES AND DEVELOPMENT PATTERNS

site	summary of existing surrounding land uses	description of surrounding building types
LF-2N	• small residential pockets • some larger industrial zones located in relatively close vicinity • close proximity to Lester Pearson International Airport	• 1-2 storey farm houses with barns • 24-floor apartment buildings 4 km away • mostly 1-storey high, warehouse-type buildings of an industrial character
LF-4N	• mostly residential • very close proximity to large tracts zoned future hazard lands and agricultural conservation areas	• typical rural housing & estate lots; some with barns • pastoral landscape with higher scenic quality due to presence of the Niagara Escarpment
LF-3C	• small residential pockets • very close proximity to numerous areas zoned future rural and hazard lands	• 1-2 storey farm houses with barns • typical rural landscape with no major or significant scenic qualities
LF-9C	• small residential pockets • very close proximity to large tracts zoned future rural and agricultural lands	• 1-2 storey farm houses with barns • typical rural landscape with no major or significant scenic quality in close proximity
LF-1E	• small residential pockets and pasture lands • very close proximity to large tracts zoned future rural and agricultural lands	• 1-2 storey farm houses with barns • typical rural landscape with no major or significant scenic quality in close proximity
PI-13N	• small residential pockets • very close proximity to large tracts zoned future agriculture, open space, hazard lands, and parkway belt	• typical rural housing & estate lots; some with barns • typical rural landscape with the Niagara Escarpment as a distant background feature
PI-1N	• small residential pockets • very close proximity to large tracts zoned future agriculture, hazard lands, and parkway belt	• typical rural housing & estate lots; some with barns • rural landscape with the Niagara Escarpment as a more present background feature
PI-27E	• small residential pockets • several existing industrial zones adjacent to site • very close proximity to areas zoned future industrial	• 1-2 storey houses; some with barns • relatively large industrial plants (ie. Ford); some with stacks of a definite industrial character

SOURCE: E.P.A. field observations

Figure 26 Visual Compatibility and Land Use

LF-4N

Legend

Existing Land Use	
▨	Industrial
■	Commercial
☐	Residential
⁘	Pasture
PHL	Publicly Held Land

Current Zoning

(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

— — —	View Shed Boundary
———	Potential Aquisition Boundary

Approx. Scale 1:30000 ↑

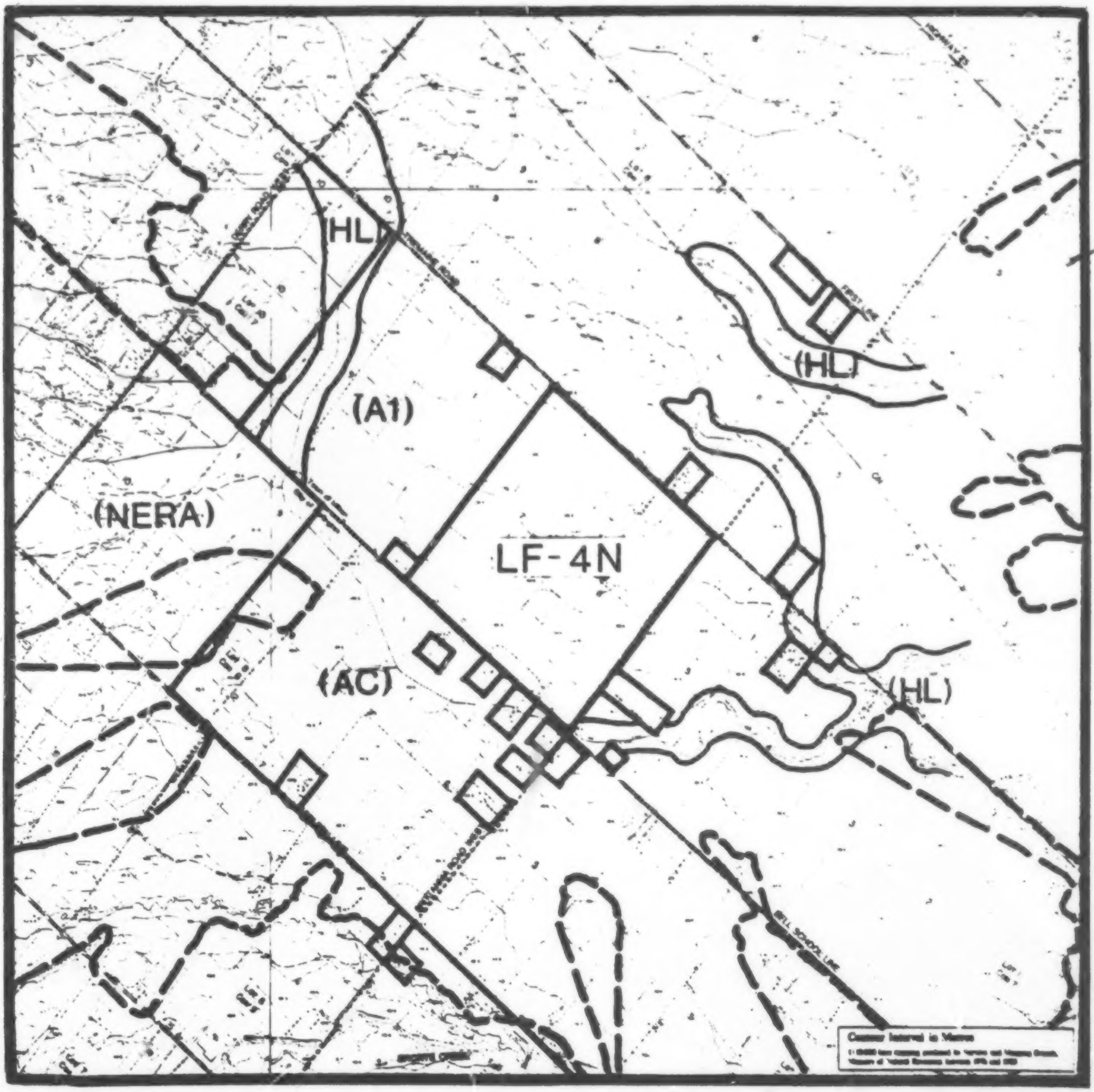


Figure 27 Visual Compatibility and Land Use

PI-1N

Legend

Existing Land Use

▨	Industrial
■	Commercial
☐	Residential
⁘	Pasture
PHL	Publicly Held Land

Current Zoning

(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

— — —	View Shed Boundary
———	Potential Aquisition Boundary

Approx. Scale 1:30000 ↑

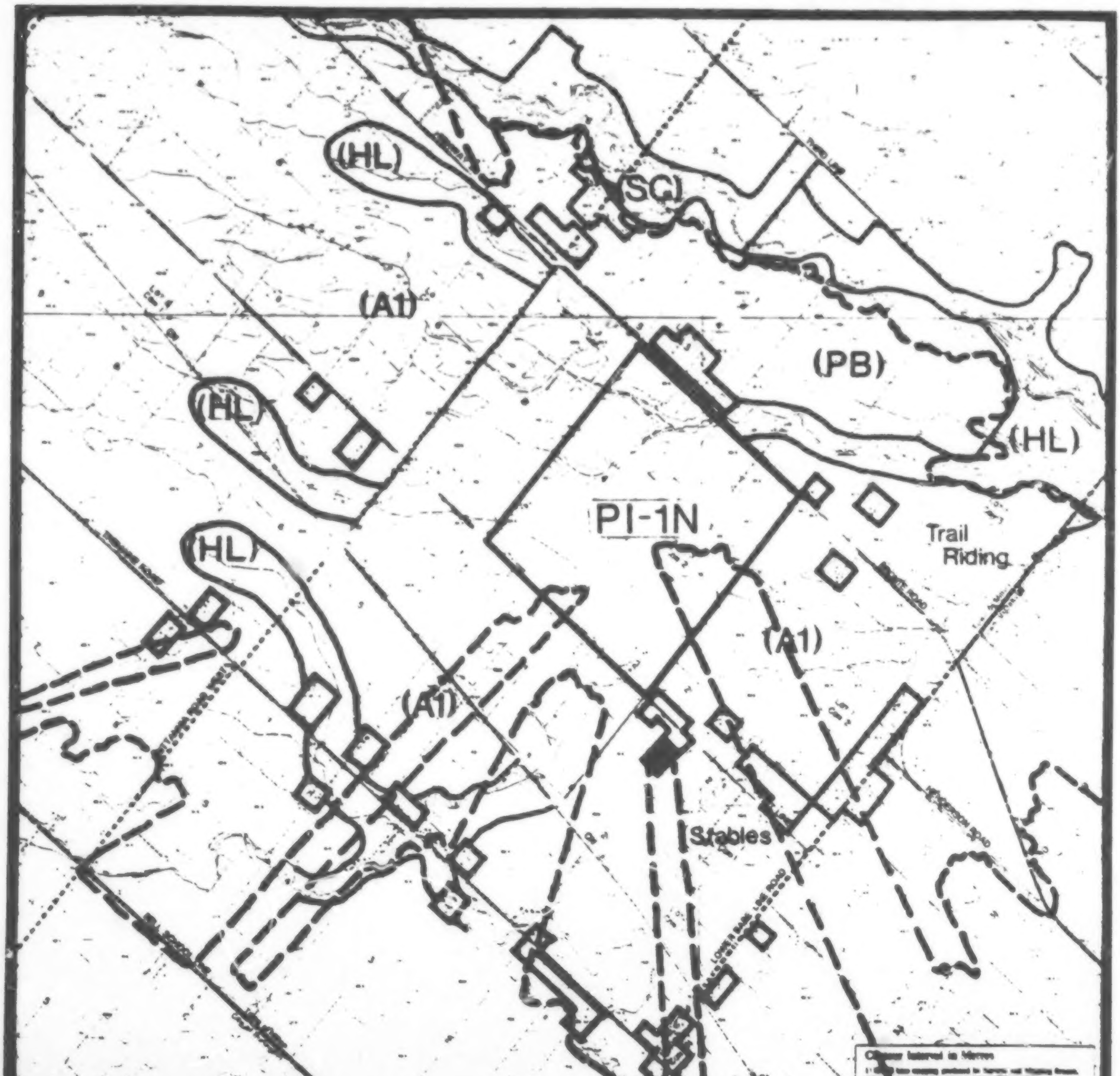

(HL)
(SC)
(A1)
(PB)
(HL)
(HL)
(HL)
PI-1N
Trail Riding
(A1)
(A1)
Stables
Contour Interval in Metres

Figure 28 Visual Compatibility and Land Use

Legend

Existing Land Use

- ▨ Industrial
- ■ Commercial
- □ Residential
- ⁘ Pasture
- PHL Publicly Held Land

Current Zoning

(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

View Shed Boundary

Potential Aquisition Boundary

Approx. Scale
1:30000

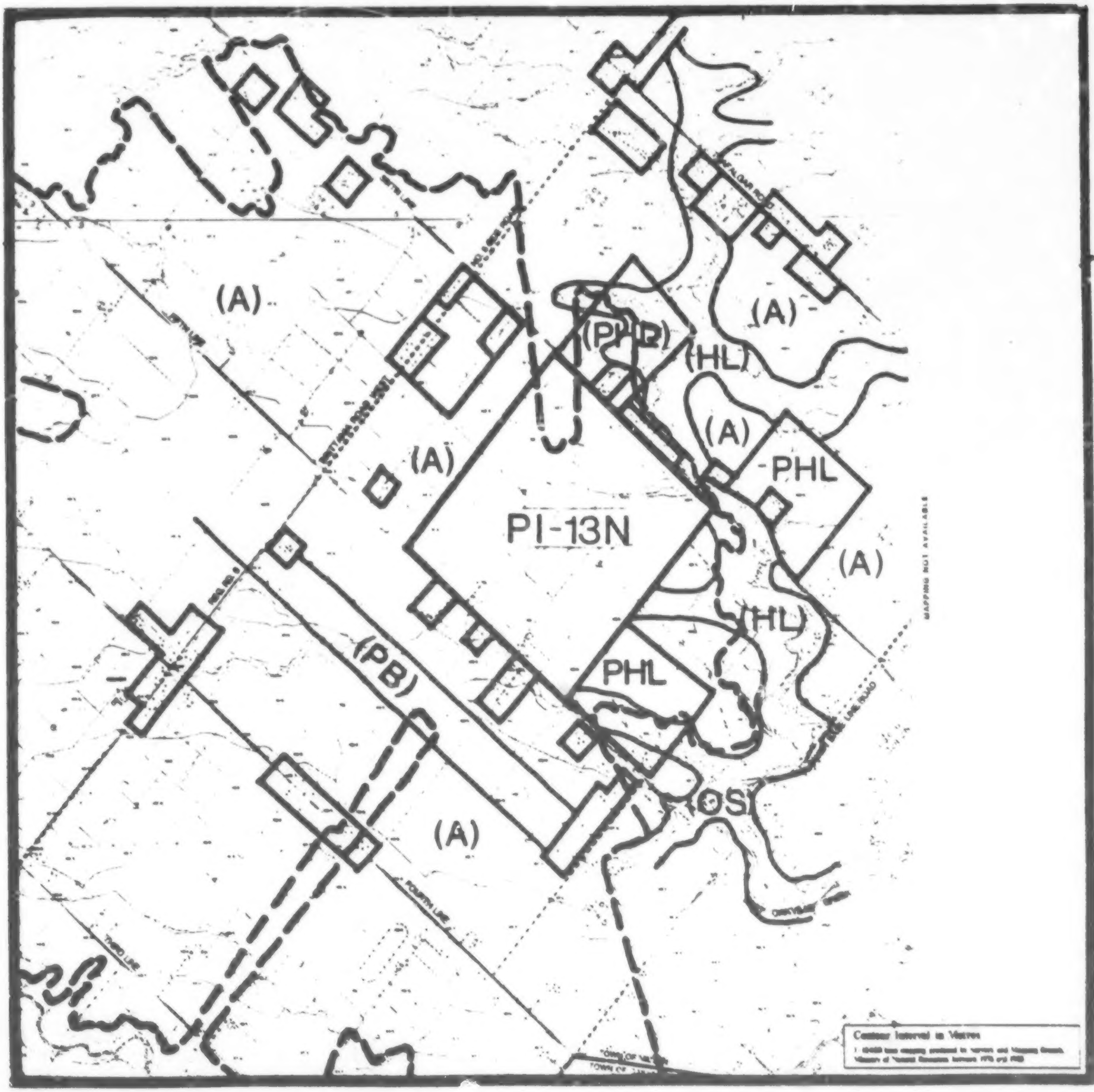

(A)
(A)
(A)
(A)
(A)
(A)
(PHL)
(HL)
(HL)
PHL
PHL
PI-13N
(PB)
(OS)
FOURTH LINE
THIRD LINE
MAPPING NOT AVAILABLE
Contour Interval in Metres

Figure 29 Visual Compatibility and Land Use

LF-3C

Legend

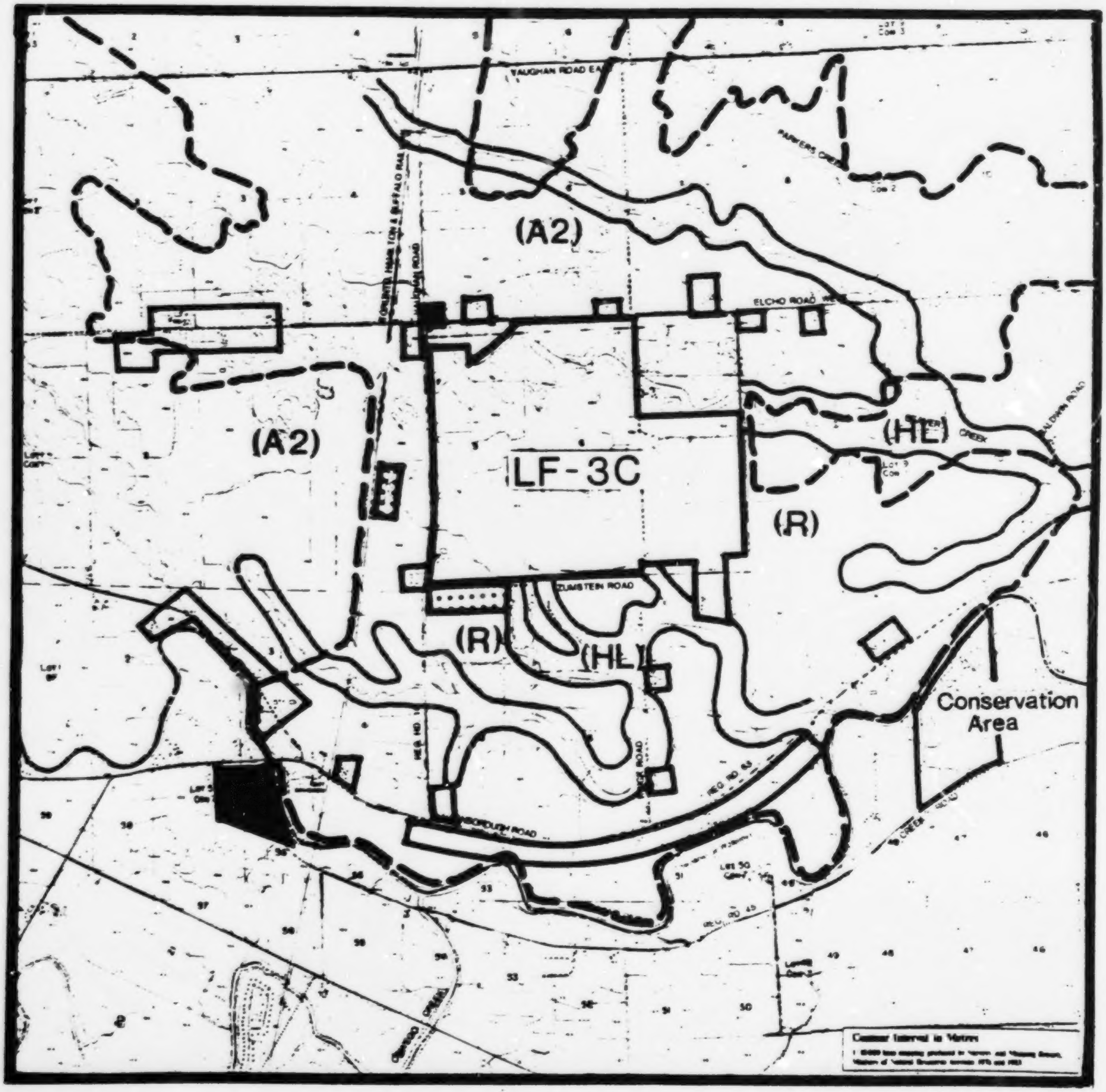
Existing Land Use	
▨	Industrial
■	Commercial
□	Residential
⁘	Pasture
PHL	Publicly Held Land

Current Zoning			
(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

— — View Shed Boundary

—— Potential Aquisition Boundary

Approx. Scale 1:30000



VAUGHAN ROAD EA
(A2)
(A2)
ELCHO ROAD
LF-3C
(HL)
(R)
(R)
ZUMSTEIN ROAD
(HL)
Conservation Area
REG. RD. 63
Contour Interval in Metres

Figure 30 Visual Compatibility and Land Use

LF-9C

Legend

Existing Land Use

▨	Industrial
■	Commercial
▭	Residential
⁘	Pasture
PHL	Publicly Held Land

Current Zoning

(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

— — —	View Shed Boundary
———	Potential Aquisition Boundary

Approx. Scale 1:30000 ↑

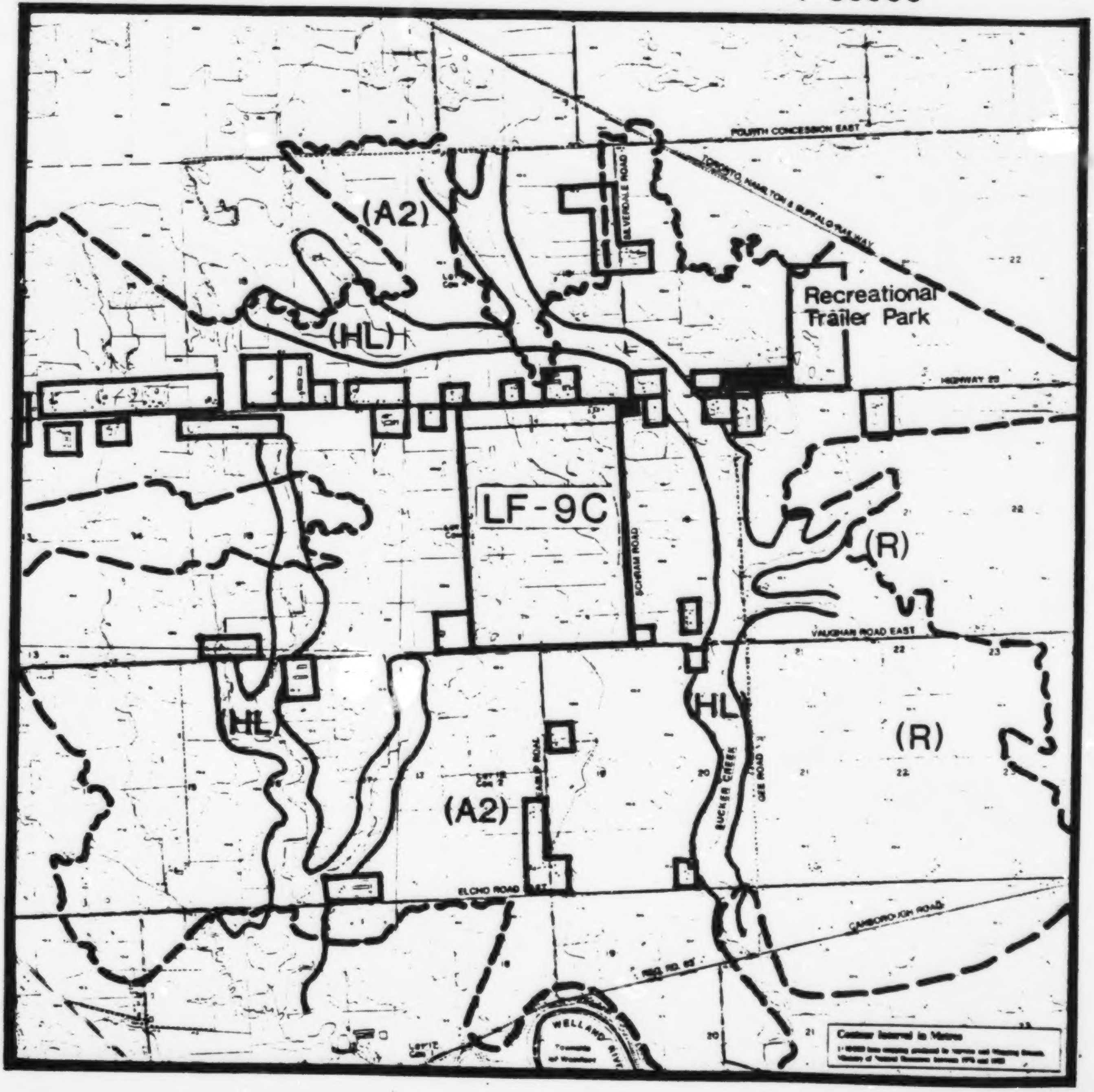

FOURTH CONCESSION EAST
TORONTO, HAMILTON & BUFFALO RAILWAY
SILVERDALE ROAD
(A2)
(HL)
Recreational Trailer Park
HIGHWAY 20
LF-9C
SCHRAM ROAD
(R)
VAUGHAN ROAD EAST
HL
SUCKER CREEK
GEE ROAD
(R)
(A2)
ELCHO ROAD
CANBOROUGH ROAD
REG. RD. 63
WELLAND
Township of Wainfleet
Contour Interval in Metres

Figure 31 Visual Compatibility and Land Use

LF-1E

Legend

Existing Land Use

▨	Industrial
■	Commercial
☐	Residential
⁘	Pasture
PHL	Publicly Held Land

Future Land Use

(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

— — —	View Shed Boundary
———	Potential Aquisition Boundary

Approx. Scale 1:30000

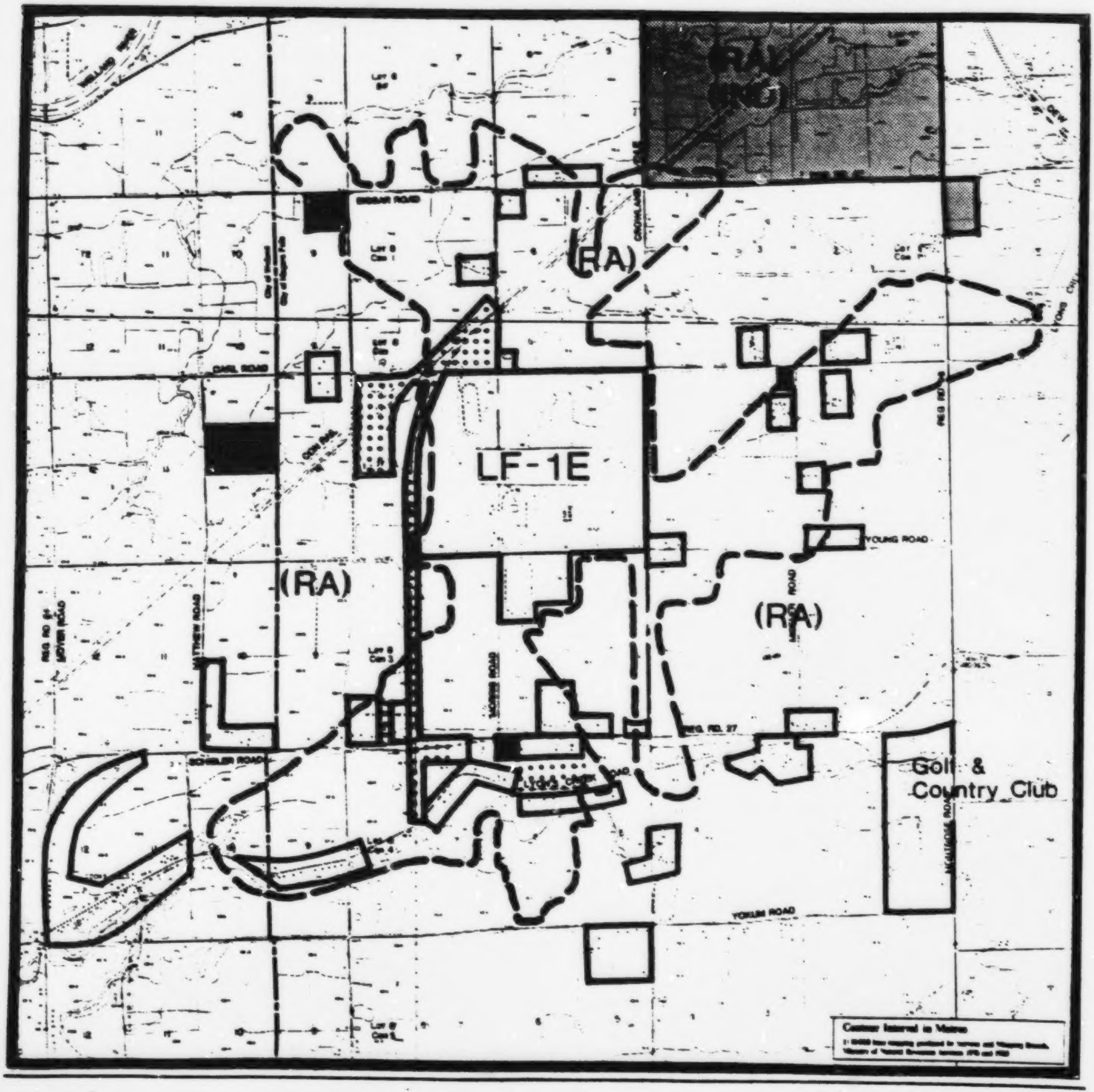

(RA)
(IND)
(RA)
LF-1E
(RA)
(RA)
YOUNG ROAD
REG. RD. 27
YOKUM ROAD
MATTHEW ROAD
MORRIS ROAD
CARL ROAD
Golf & Country Club
Contour Interval in Metres

Figure 32 Visual Compatibility and Land Use

PI-27E

Legend

Existing Land Use	
▨	Industrial
■	Commercial
▭	Residential
⁘	Pasture
PHL	Publicly Held Land

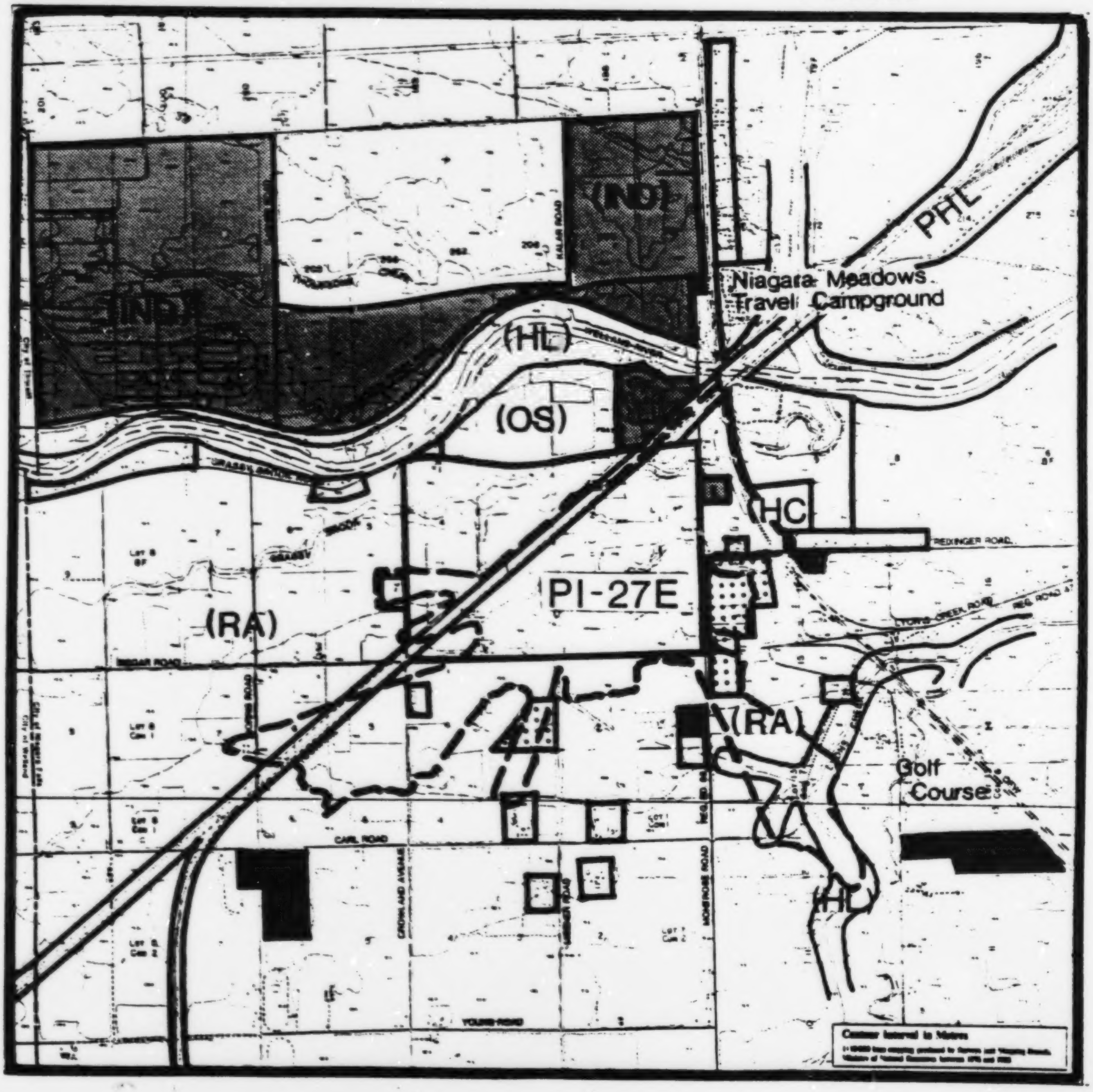
Current Zoning			
(IND)	Industrial	(A_2)	Agricultural A_2
(C)	Commercial	(AC)	Agricultural Conservation
(HC)	Highway Commercial	(HL)	Hazard Lands
(OS)	Public Open Space	(SC)	Special Complimentary Use
(PB)	Parkway Belt	(NERA)	Niagara Escarpment Rural Area
(A_1)	Agricultural A_1	(R)	Rural

View Shed Boundary

Potential Aquisition Boundary

Approx. Scale 1:30000

↑


(IND)
(IND)
PHL
Niagara Meadows Travel Campground
(HL)
(OS)
(HC)
REIXINGER ROAD
PI-27E
(RA)
BIGGAR ROAD
LYONS CREEK ROAD
(RA)
Golf Course
CARL ROAD
CROWLAND AVENUE
MONTROSE ROAD
(HL)
YOUNG ROAD
Contour Interval in Metres

Intrusion on Passing Traffic (Dynamic Viewer)
This analysis dealt with the number of vehicles potentially exposed to the proposed facility.

Several types of information were reviewed and analyzed. These included plotting the viewshed boundary and traffic counts on nearby roads and highways. The viewshed boundary was plotted in the same way as done in the previous analysis. Traffic counts were taken from the MTC Highway Traffic Volumes, 1983 for the major and secondary highways and tertiary roads. Regional road traffic volumes were provided by M.M. Dillon Ltd. Roads where traffic volumes were not available were not included in these calculations. Traffic counts are illustrated in Figures 33, 34, 35, 36, 37, 38 and 39.

Traffic volumes (average daily traffic count) were totalled for road segments within the limit of visibility. These are gross figures for vehicles only and do they take into account the minor screening potential at each site. It was assumed that the drivers may not be greatly aware of the facilities due to their restricted cone of vision but would be exposed to potential views. It was also assumed that since traffic was moving, existing vegetation along site boundaries and off-site areas would not totally screen views to the proposed facilities. Since traffic is dynamic, it was assumed that even though some portions of some sites were screened, other areas would be open to view. For these reasons, only gross traffic volumes were used.

Table 7 summarizes the traffic volumes on the exposed roadways for each site. In order to generate the total traffic volumes for cases 2 and 3, the appropriate figures, were combined to produce the aggregate totals as shown on Table 8.

Siting options which had relatively low numbers of vehicles exposed to view, were considered to have less intrusion; whereas siting options which had relatively high number of vehicles exposed to view were considered to have greater intrusion.

The total traffic volumes summarized in Table 8 reveal great differences between the siting options. Option LF-3C has, by far, the least traffic volume potentially exposed to the facility views. Option LF-9C had many more times the volume of traffic potentially exposed to the views of the facility, but far less than option LF-1E. It is significant to point out that these are all fully integrated options.

TABLE 7 - TRAFFIC VOLUMES FOR EACH SITE

site	influential roads/hwys. surrounding or adjacent to sites	sector	annual average daily traffic count (AADT) (in thousands)	total annual average daily traffic counts for all influential roads/hwys.
LF-2N	Hwy. 10	Hwy. 401 to Derry Rd.	21.6	125.3
	Hwy. 401	Hwy. 410 to Hwy. 10	76.7	
	Hwy. 410	Derry Rd. to Hwy. 401	14.8	
	Reg. Rd. 25 (Derry Rd.)	Hwy. 410 to Hwy. 10	12.2	
LF-4N	Hwy. 401	West of Hwy. 25	38.5	48.1
	Hwy. 25	Hwy. 5 to Base Line Rd.	7.2	
	Reg. Rd. 22 (Tremaine Rd.)	Brittania Rd. to Reg. Rd. 25 (Derry Rd. W.)	1.6	
	Reg. Rd. 6 (Brittania Rd. W.)	First Line to School Line	0.5	
	First Line	Brittania East to Hwy. 25	0.3	
LF-3C	Reg. Rd. 16 (Vaughan Rd.)	Elcho Rd. to Reg. Rd. 65	0.5	0.66
	Krick Rd.	Vaughan to Elcho	0.06	
	Elcho Rd.	Reg. Rd. 27 to Reg. Rd. 16	0.1	
LF-9C	Hwy. 20	Bismark Rd. to Niagara Rd. 69	3.5	8.5
	Hwy. 20	Reg. Rd. 24 to Reg. Rd. 65	2.9	
	Reg. Rd. 27	Hwy. 20 to Elcho Rd.	2.0	
	Shram Rd.	Hwy. 20 south	0.1	
LF-1E	Q.E.W.	Reg. Rd. 63 to Reg. Rd. 47	14.8	26.9
	Reg. Rd. 98	Carl Rd. to Reg. Rd. 27	4.1	
	Reg. Rd. 47	Reg. Rd. 98 to Q.E.W.	4.0	
	Reg. Rd. 47	Reg. Rd. 98 to Morris Rd.	0.4	
	Reg. Rd. 27	Reg. Rd. 98 to Morris Rd.	2.8	
	Crowland Ave.	Carl Rd. to Schisler	0.6	
	Carl Rd.	Reg. Rd. 98 to Morris Rd.	0.2	
PI-13N				
	Reg. Rd. 6	Third Line to Fifth Line	1.2	15.9
	Reg. Rd. 6 (Brittania Rd. W.)	Trafalgar Rd. to Fifth Line	1.6	
	James Snow Pkwy. (Fourth Line or Reg. Rd. 6)	Hwy. 401 to Reg. Rd. 6	3.8	
	Sixth Line Rd.	Derry to site	6.8	
	Fifth Line Rd.	Main St. to Brittania/to site	2.5	
PI-1[illegible]	Hwy. 25	Hwy. 5 to Base Line Rd.	7.2	49.3
	Hwy. 401	West of Hwy. 25	38.5	
	Tremaine Rd.	Brittania to Reg. Rd. 25	1.6	
	Reg. Rd. 6 (Brittania Rd. W.)	Hwy. 25 to Tremaine	0.8	
	Reg. Rd. 6 (Brittania Rd. W.)	Hwy. 25 to Third line	1.2	
PI-27E	Q.E.W.	Reg. Rd. 63 to Reg. Rd. 47	14.8	18.7
	Reg. Rd. 98	Reg. Rd. 63 to Reg. Rd. 47	3.5	
	Reg. Rd. 47	Reg. Rd. 98 to Morris Rd.	0.4	
	Grassy Brook Rd.	Crowland Ave. to Reg. Rd. 98	no available data	

SOURCE: Traffic Volumes, Transportation Report; M.M. Dillon Ltd.

TABLE 8 - Traffic Volumes for Siting Options
(passing within viewshed boundary)

Integrated	**Traffic Counts**
LF-3C	.66
LF-9C	8.5
LF-1E	26.9
Partially Integrated	
LF-4N and PI-13N (case 2 and 3)	48.1 + 15.9 = 64.0
LF-4N and PI-1N (case 2 and 3)	48.1 + 49.3 = 97.4
LF-1E and PI-27E (case 2 and 3)	26.9 + 18.7 = 45.6

The partially integrated options all have substantially higher volumes of traffic potentially exposed to views of the facility. This is because they are located on roads where volumes are generally greater, but also because volumes were combined for the two sites. Potentially, a vehicle may be exposed to both sites for the partially integrated options. The totalled traffic volumes were considered valid since the vehicle would be exposed to two major facilities, and this would represent a true level of intrusion on the dynamic viewer. The resulting ranking is summarized below:

	Rank	Siting Option	Case
Least intrusion	1	LF-3C	1
	2	LF-9C	1
	3	LF-1E	1
	4	LF-1E and PI-27E	2 and 3
Greatest intrusion	5	LF-4N and PI-13N	2 and 3
	6	LF-4N and PI-1N	2 and 3

The final rankings noted above, vary somewhat from those appearing in the social impact analysis report. This is due to the exclusion of portions of the Highway 401 traffic counts in the background zone of site PI-13N. This resulted in the upgrading of siting option LF-4N and PI-13N (cases 2 and 3) from sixth-ranked to fifth-ranked position.

This change in ranking brings this siting option much closer to the fourth-ranked siting option, LF-1E and PI-27E (cases 2 and 3). However, it is still substantially short of ranking in the top four for this indicator.

Figure 33 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

LF-4N

Legend

1.6 Annual Average Daily Traffic (AADT) Count Sector for Major Roads & Hwys.

(4.0) Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.

0.8 Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.

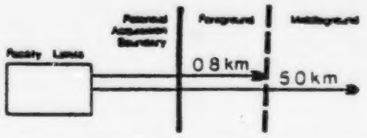
(4.0) Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.

(in thousands)

▬ ▬ ▬ Access Road

── Potential Aquisition Boundary

— — — View Shed Boundary


Facility Lands
Potential Acquisition Boundary
Foreground
Middleground
0 8 km
5 0 km

Approx. Scale 1:30000

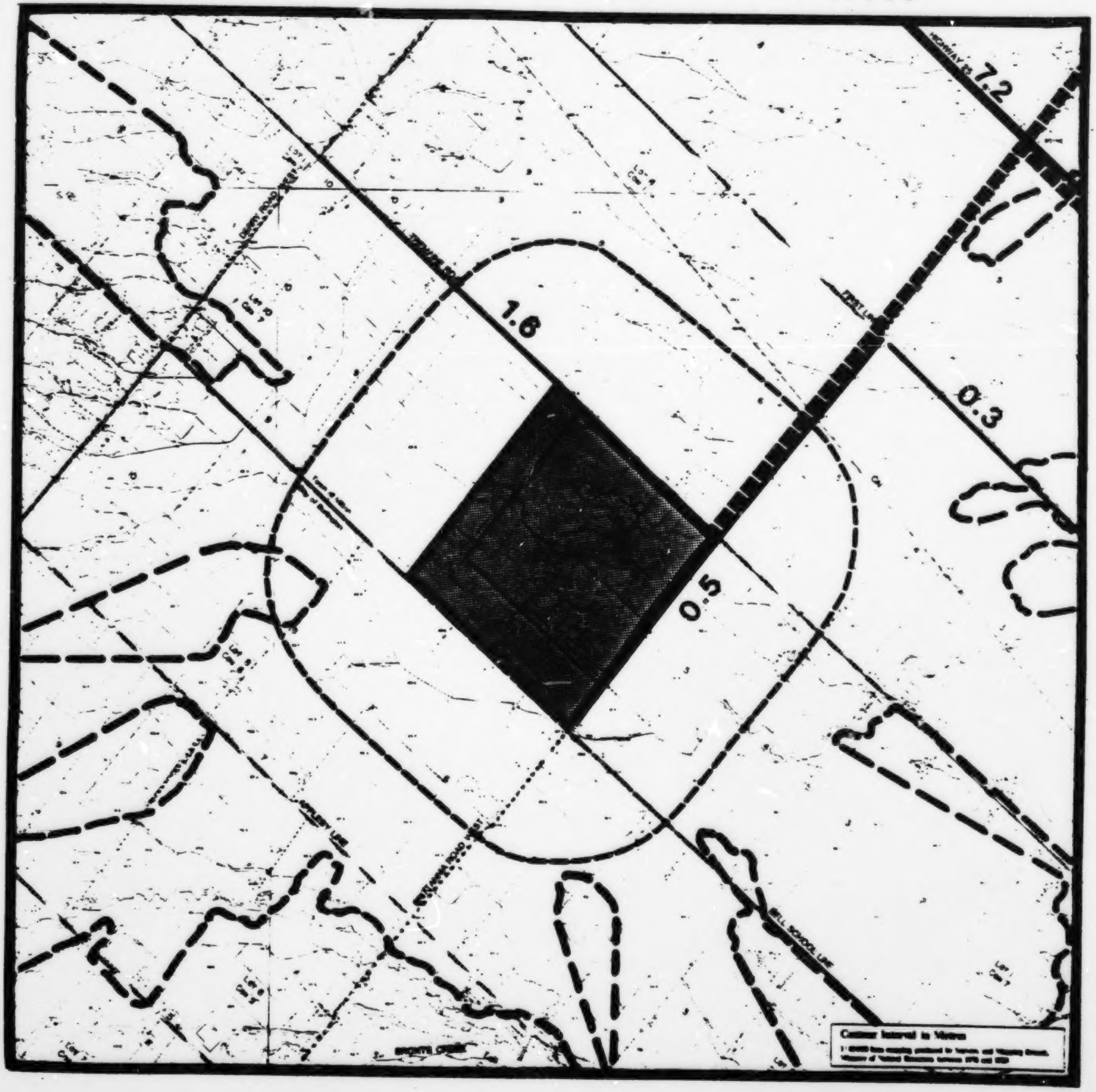

7.2
HIGHWAY 12
1.6
0.3
0.5
BELL SCHOOL LINE
APPLEBY LINE
Contour Interval in Metres

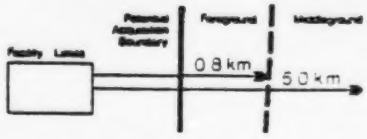
Figure 34 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

PI-1N

Legend

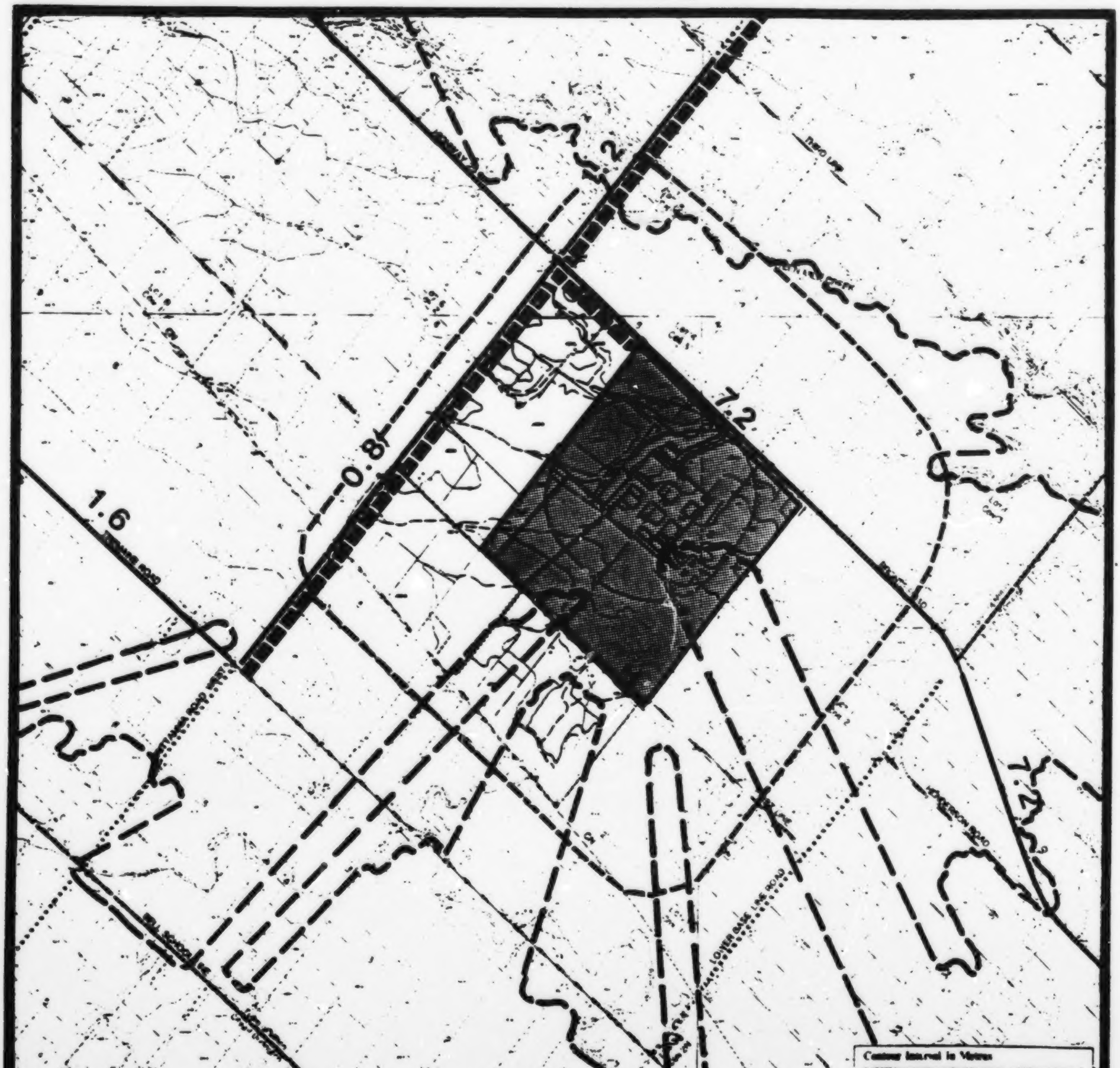
1.6	Annual Average Daily Traffic (AADT) Count Sector for major Roads & Hwys.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.
0.8	Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.
■■■	Access Road
—	Potential Aquisition Boundary
— — –	View Shed Boundary

(in thousands)



Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale
1:30000



7.2
7.2
0.8
1.6
7.2
HENDERSON ROAD
Contour Interval in Metres

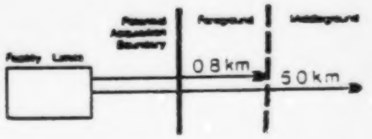
PI-13N

Figure 35 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

Legend

1.6	Annual Average Daily Traffic (AADT) Count Sector for major Roads & Hwys.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.
0.8	Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.
▬ ▬ ▬	Access Road
▬	Potential Aquisition Boundary
— — –	View Shed Boundary

(in thousands)



Approx. Scale
1:30000

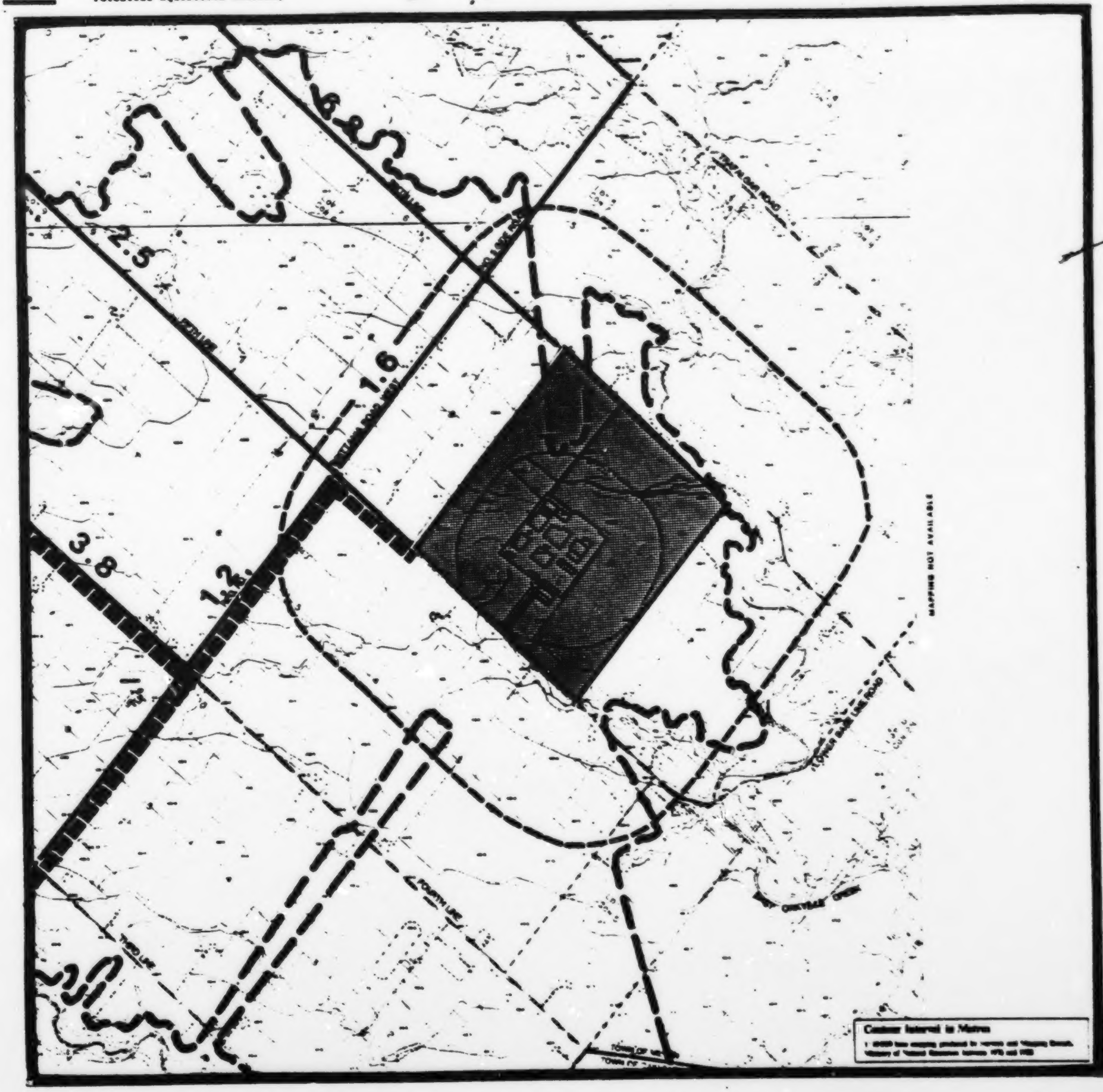

6.2
2.5
1.6
1.2
3.8
MAPPING NOT AVAILABLE
FOURTH LINE
THIRD LINE
Contour Interval in Metres

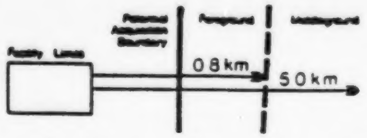
Figure 36 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

LF-3C

Legend

1.6	Annual Average Daily Traffic (AADT) Count Sector for major Roads & Hwys.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.
0.8	Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.
▬ ▬ ▬	Access Road
▬	Potential Aquisition Boundary
▬ ▬ ▬	View Shed Boundary

(in thousands)


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8km
5.0km

Approx. Scale 1:30000

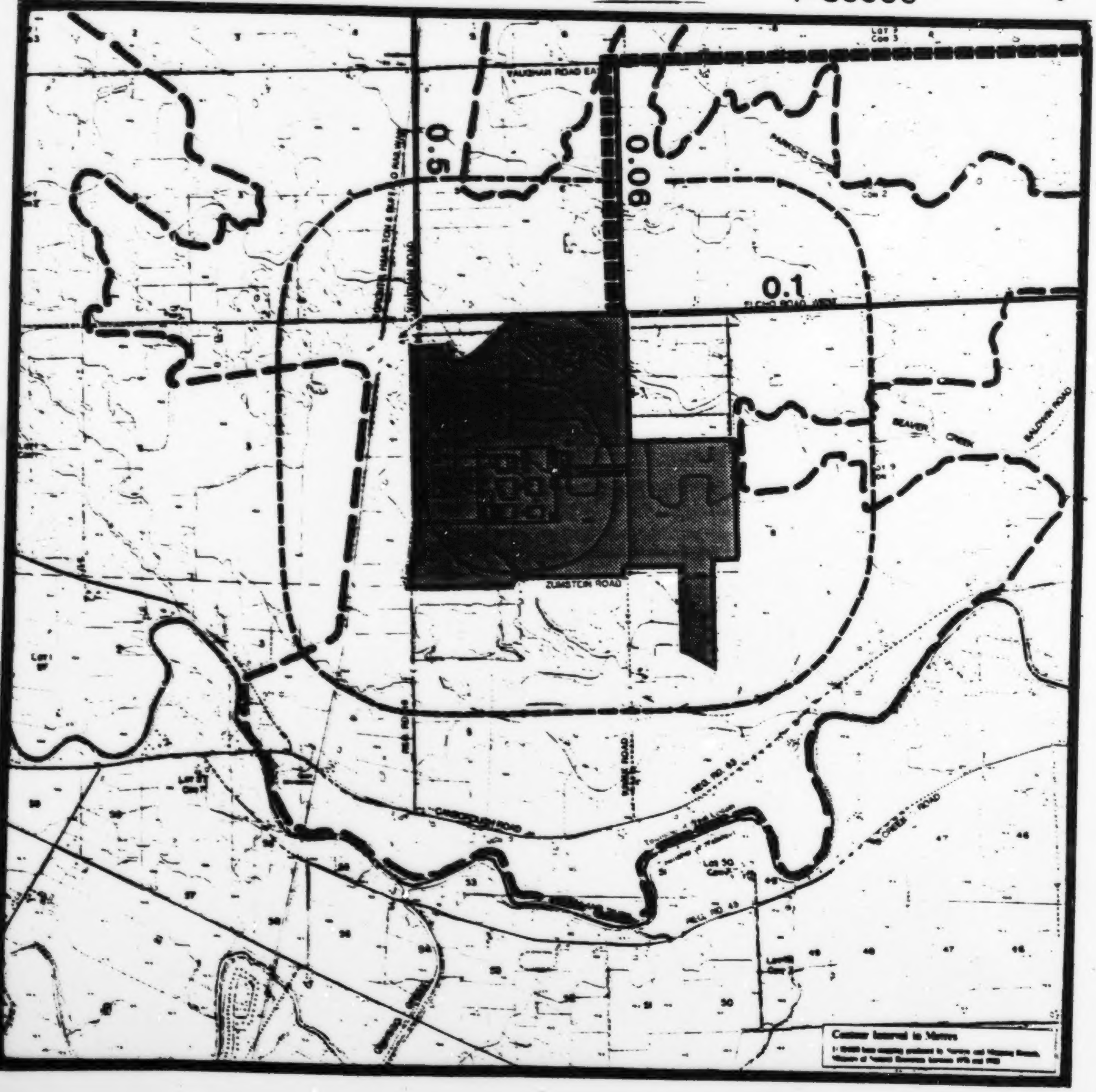
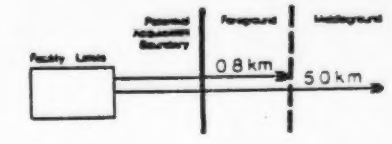

0.5
0.06
0.1
VAUGHAN ROAD EAST
ELCHO ROAD WEST
VAUGHAN ROAD
ZUMSTEIN ROAD
BEAVER CREEK
BALDWIN ROAD
CANBOROUGH ROAD
REG. RD. 63
REG. RD 45
Con 2
Con 3
Contour Interval in Metres

Figure 37 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

Legend

1.6	Annual Average Daily Traffic (AADT) Count Sector for Major Roads & Hwys.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.
0.8	Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.
■■■	Access Road
—	Potential Aquisition Boundary
— — —	View Shed Boundary

(in thousands)


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale 1:30000

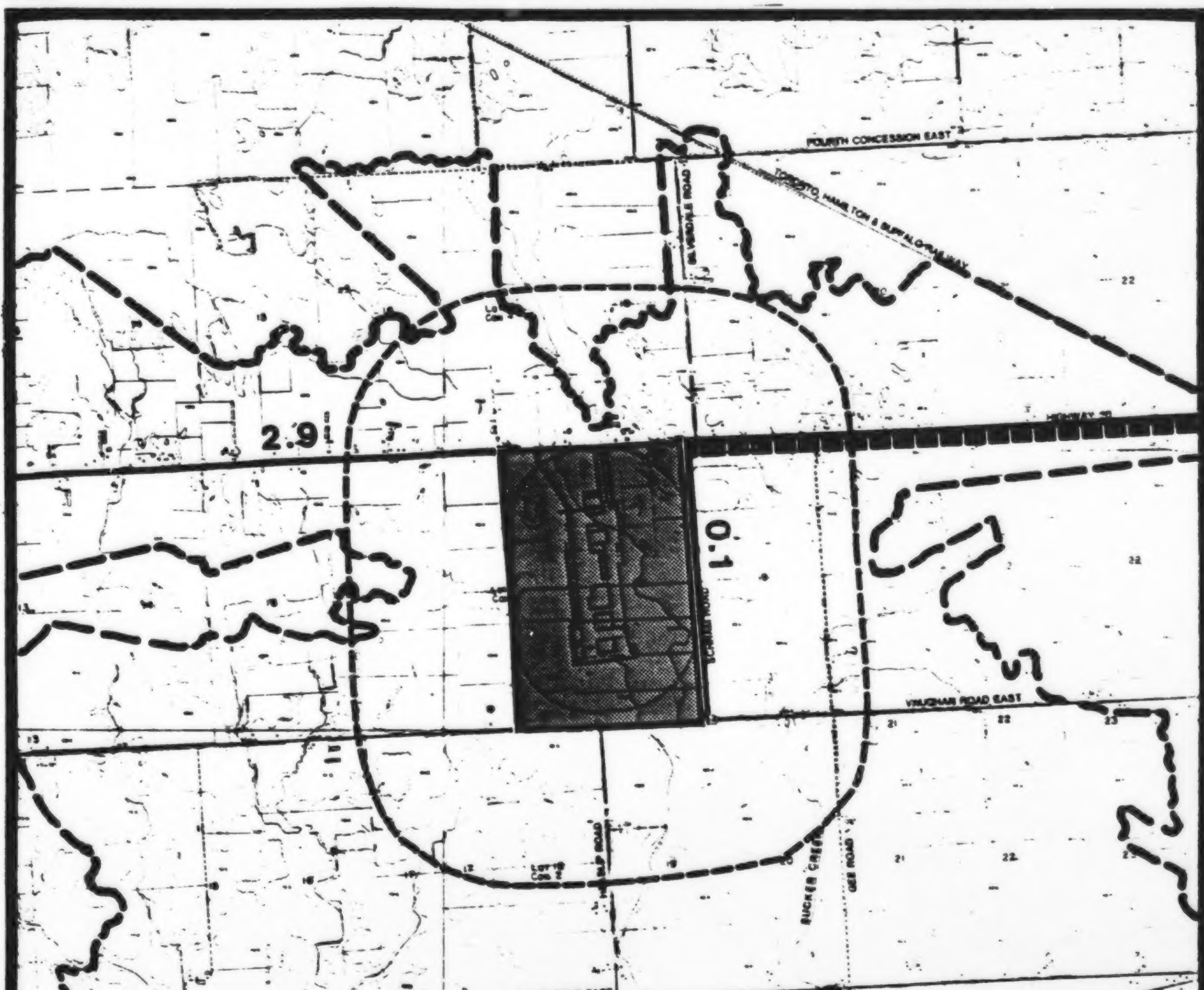

FOURTH CONCESSION EAST
TORONTO, HAMILTON & BUFFALO RAILWAY
HIGHWAY 20
2.9
0.1
VAUGHAN ROAD EAST
SUCKER CREEK
ELCHO ROAD EAST
CANBOROUGH ROAD
WELLAND RIVER
Contour Interval in Metres

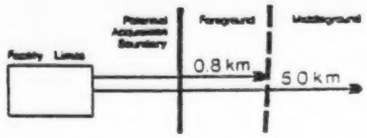
Figure 38 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

LF-1E

Legend

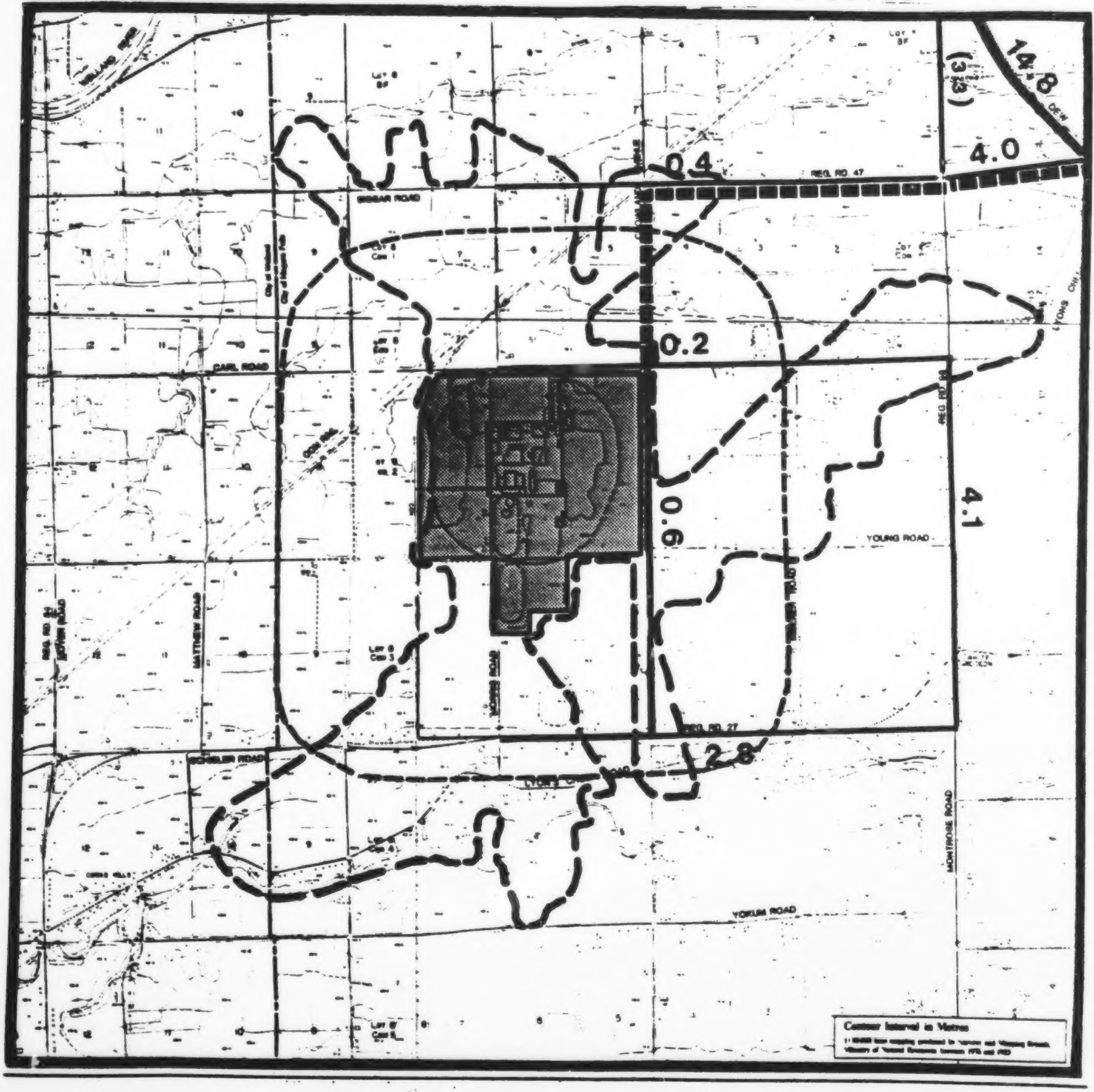
1.6	Annual Average Daily Traffic (AADT) Count Sector for Major Roads & Hwys.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & Hwys.
0.8	Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.
(4.0)	Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.
■■■	Access Road
──	Potential Aquisition Boundary
‒ ‒ ‒	View Shed Boundary

(in thousands)



Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5 0 km

Approx. Scale 1:30000



14.8
(3.3)
4.0
0.4
REG. RD. 47
BIGGAR ROAD
0.2
CARL ROAD
4.1
REG. RD. 98
0.6
YOUNG ROAD
MATTHEW ROAD
REG. RD. 27
2.8
SCHISLER ROAD
MONTROSE ROAD
YORKUM ROAD
Contour Interval in Metres

Figure 39 Traffic Counts and Potential Facility Intrusion on Passing Traffic (Dynamic Viewer)

PI-27E

Legend

1.6 Annual Average Daily Traffic (AADT) Count Sector for Major Roads & Hwys.

(4.0) Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Major Roads & hwys.

0.8 Annual Average Daily Traffic (AADT) Sector Count for Regional & Local Roads.

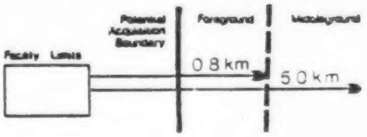
(4.0) Summer Average (June to September) Traffic Sector Count for Recreation - Tourist Purpose Vehicle Trips on Regional & Local Roads.

(in thousands)

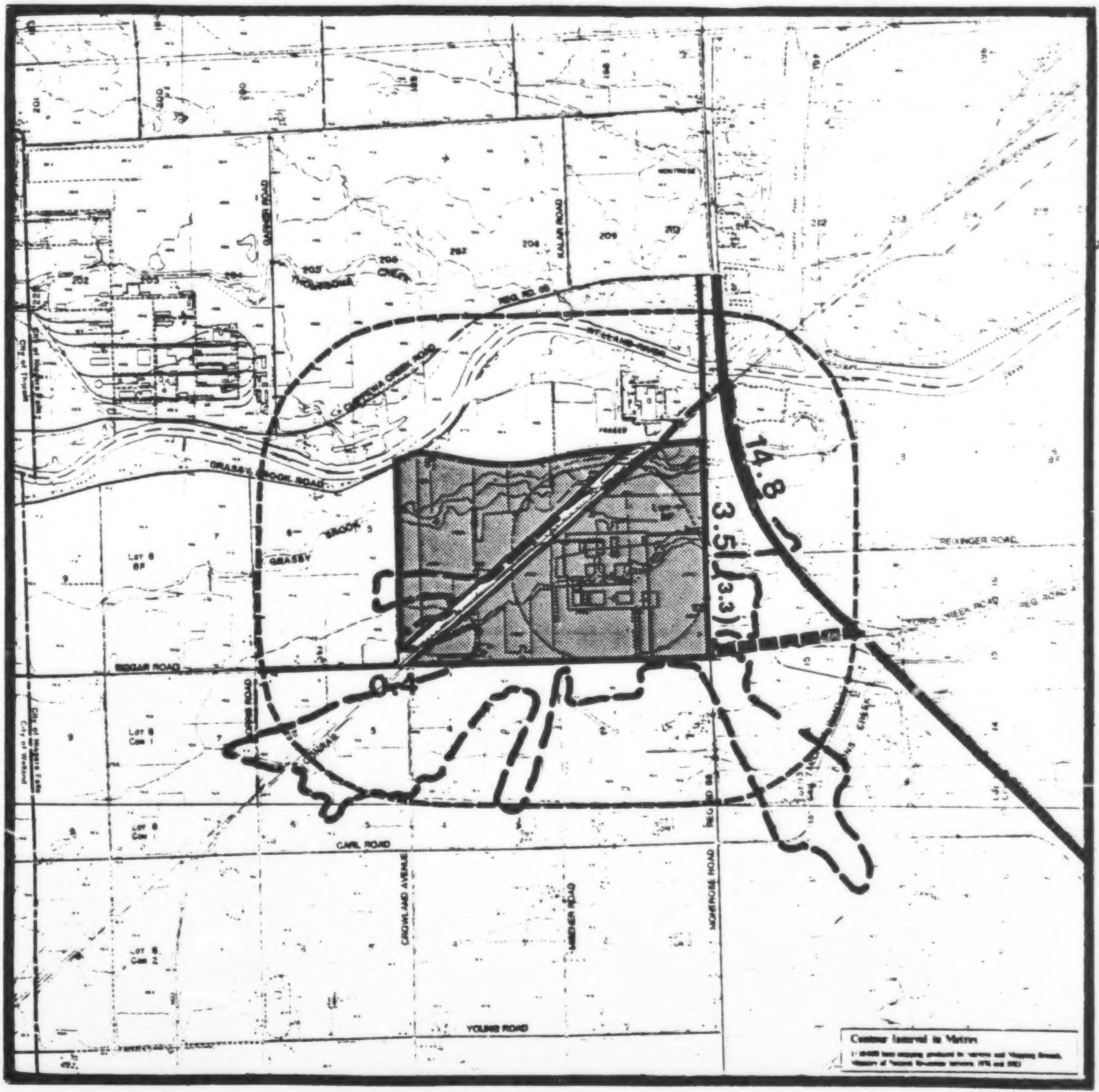
Access Road

Potential Aquisition Boundary

View Shed Boundary


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale 1:30000


14.8
3.5
(3.3)
0.4
GARNER ROAD
KALAR ROAD
MONTROSE
CHIPPAWA CREEK ROAD
REG. RD. 63
GRASSY BROOK ROAD
GRASSY BROOK
FRASER
REIXINGER ROAD
LYONS CREEK ROAD
REG. ROAD
BIGGAR ROAD
Lot 8 BF
Lot 8 Con 1
Lot 8 Con 1
Lot 8 Con 2
City of Niagara Falls
City of Thorold
City of Niagara Falls
City of Welland
CARL ROAD
CROWLAND AVENUE
MONTROSE ROAD
YOUNG ROAD
LYONS CREEK
Contour Interval in Metres

Intrusion on Surrounding Households (Resident Viewer)
This analysis estimated the number of households surrounding each of the sites which would potentially be exposed to a view of the proposed facility.

The viewshed boundaries were plotted based on the proposed location of the facility on each site as well as the existing visual screening remaining on and around the sites. It was assumed that major woodlots would be preserved on the sites within the 50 meter facility setback and other site areas where no site development was proposed.

The household count data were provided by Leon Kentridge Associates and plotted on base maps using an overlay technique. The households with possible views to the facilities were then identified. The number of households were identified that would be exposed to potential views to the facilities from the foreground (0-0.8km.) and the middleground (0.8-5.0km.). The household count data supplied by Leon Kentridge Associates however covered only the area within 2.0 km. of each site. Beyond this area only 1981 Census data was available with no information on location aspects. These data were not considered reliable for use in this analysis. Therefore potential visual intrusions were identified only for households that could be located within 2 km. of the site. These data were considered adequate to provide comparative impact results for this analysis. Table 9 summarizes number of households exposed to views of the facility by site. Figures 40 through 52 illustrate the viewsheds, foreground and middleground zones and household counts.

Table 10 summarizes the total number of households potentially exposed to views of the proposed facility by siting option.

The results of this assessment indicate that the siting option having the least number of households with high visual impact was option LF-1E, followed by LF-1E/PI-27E and LF-3C. These options were fairly closely ranked. Option LF-9C had almost twice as many households with high visual impact. The other partially integrated siting options had far greater numbers of highly impacted households.

Siting option LF-1E also had the fewest number of households with medium visual impacts, closely followed by LF-1E/PI-27E. Options LF-3C and LF-9C were closely ranked with somewhat more exposed households. Once again, the other partially integrated siting options had far greater numbers of households with medium impacts.

The totals of the households with high and medium visual impacts confirmed these general findings and resulted in the following ranking:

	Rank	Siting Option	Case
Least intrusion	1	LF-1E	1
	2	LF-1E and PI-27E	2 and 3
	3	LF-3C	1
	4	LF-9C	1
Greatest intrusion	5	LF-4N and PI-1N	2 and 3
	6	LF-4N and PI-13N	2 and 3

TABLE 9 - Number of Households Exposed to View (by Site and Case)

site	number of households with view of facility 0-0.8 km.	0.8-2.0 km.	TOTAL
LF-4N (case 2)	18	71	89
LF-4N (case 3)	18	71	89
LF-3C (case 1)	16	42	58
LF-9C (case 1)	28	48	76
LF-1E (case 1)	11	35	46
LF-1E (case 2)	11	35	46
LF-1E (case 3)	11	35	46
PI-13N (case 2)	36	52	88
PI-13N (case 3)	36	52	88
PI-1N (case 2)	25	60	85
PI-1N (case 3)	25	60	85
PI-27E (case 2)	4	2	6
PI-27E (case 3)	4	2	6

TABLE 10 - Composite Number of Households Exposed to View (by siting option)

	HOUSEHOLDS WITH HIGH IMPACT	HOUSEHOLDS WITH MEDIUM IMPACT	TOTAL
LF-1E (case 1)	11	35	46
LF-3C (case 1)	16	42	58
LF-9C (case 1)	28	48	76
LF-1E and PI-27E (case 2)	15	37	52
LF-1E and PI-27E (case 3)	15	37	52
LF-4N and PI-1N (case 2)	43	123	174
LF-4N and PI-1N (case 3)	43	123	174
LF-4N and PI-13N (case 2)	54	131	177
LF-4N and PI-13N (case 3)	54	131	177

Figure 40 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF-4N
case 2

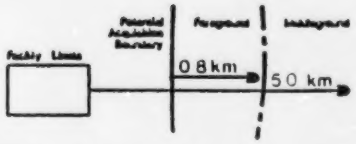
Legend

▨ Existing Major Tree Masses

☐ Area Exposed To Site Facility

▨ View Shed Boundary

▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale
1:30000

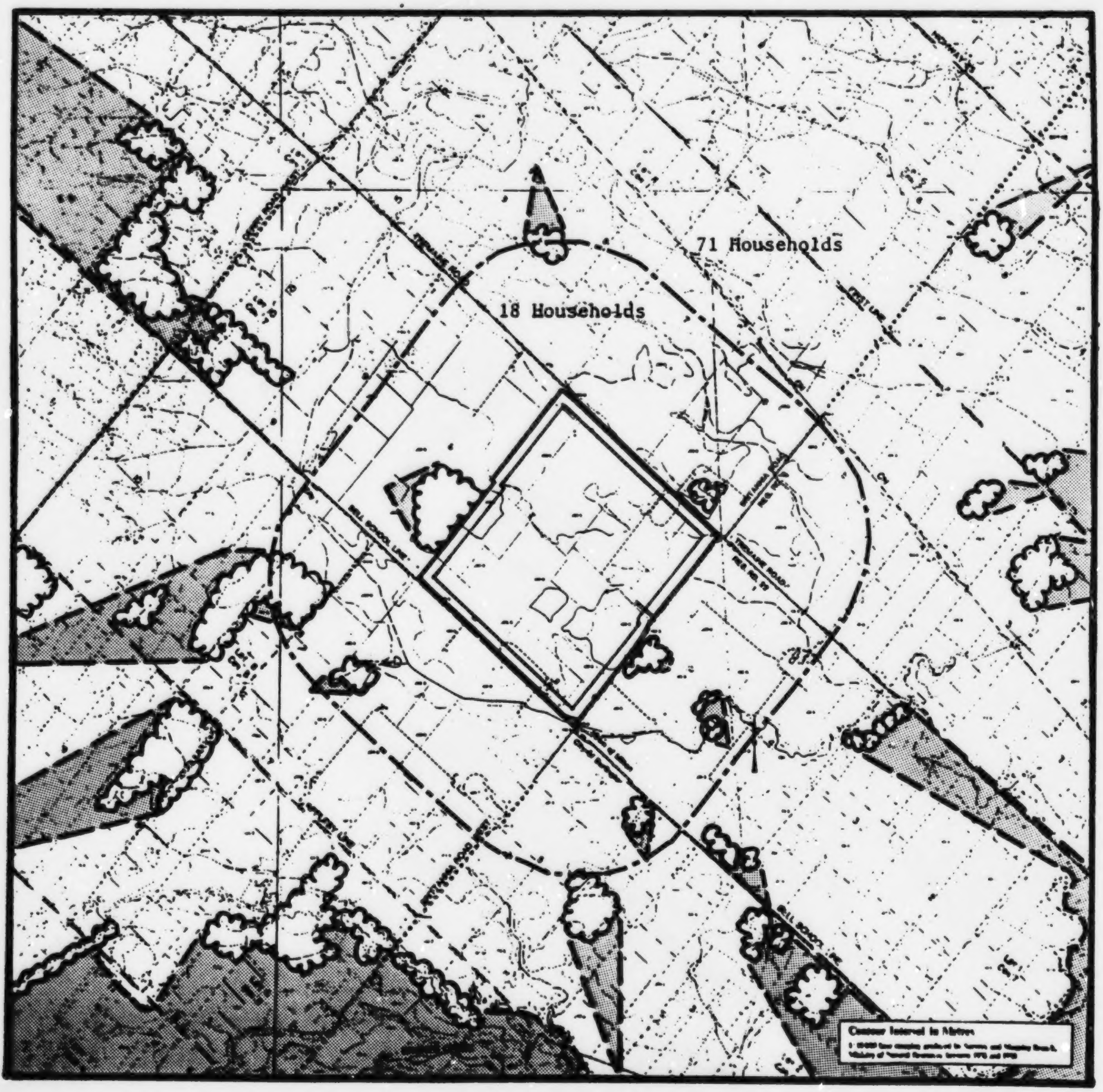
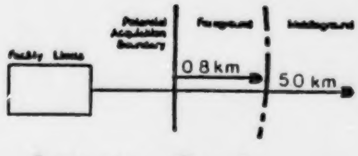

71 Households
18 Households
Contour Interval in Metres

Figure 41 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF-4N
case 3

Legend

- ☁ Existing Major Tree Masses
- ⌒ View Shed Boundary
- ☐ Area Exposed To Site Facility
- ▩ 45m Stack View Shadow Zone
- ▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale
1:30000

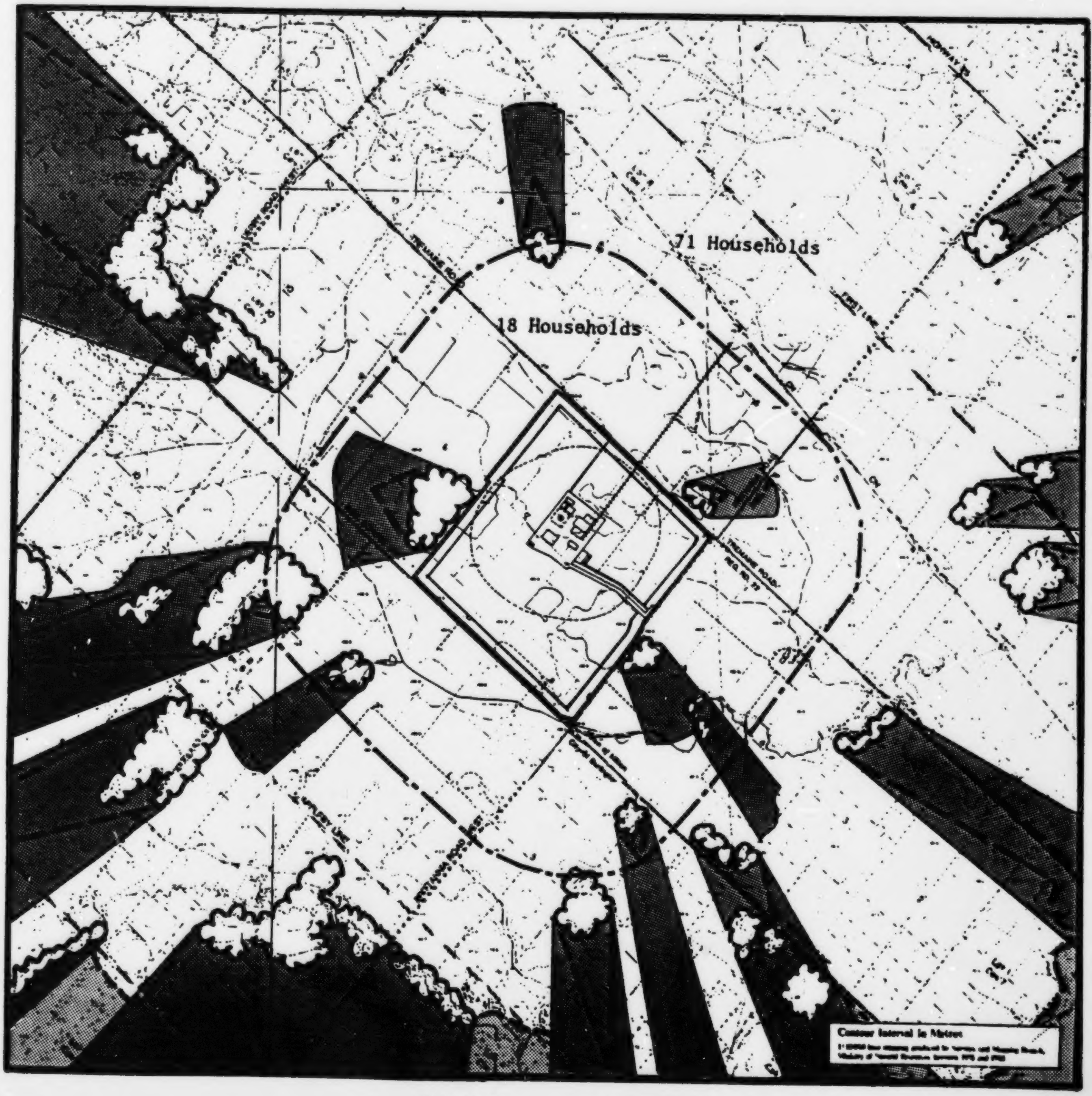
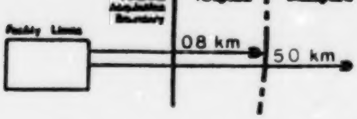

71 Households
18 Households
Contour Interval in Metres

Figure 42 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI-1N
case 2

Legend

- ▭ Existing Major Tree Masses
- ⌒ View Shed Boundary
- □ Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▩ 45m Stack View Shadow Zone
- ▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
08 km
50 km

Approx. Scale
1:30000

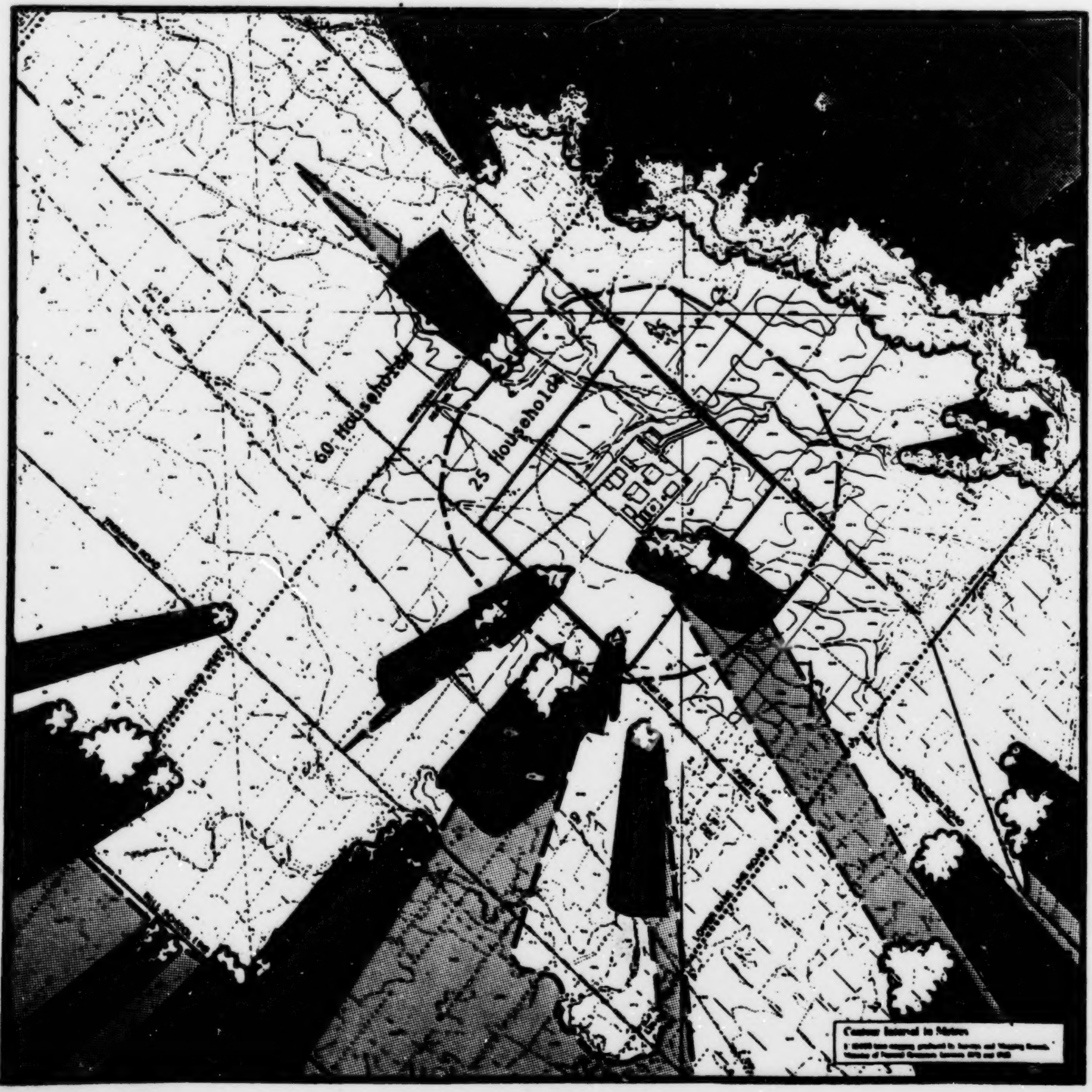
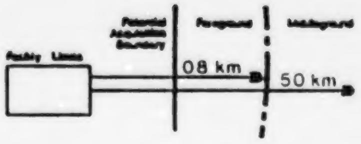

60 Households
25 Households
Contour Interval in Metres

Figure 43 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI - 1N
case 3

Legend

- Existing Major Tree Masses
- View Shed Boundary
- Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▨ Facility and/or Landfill View Shadow Zone



Approx. Scale
1:30000

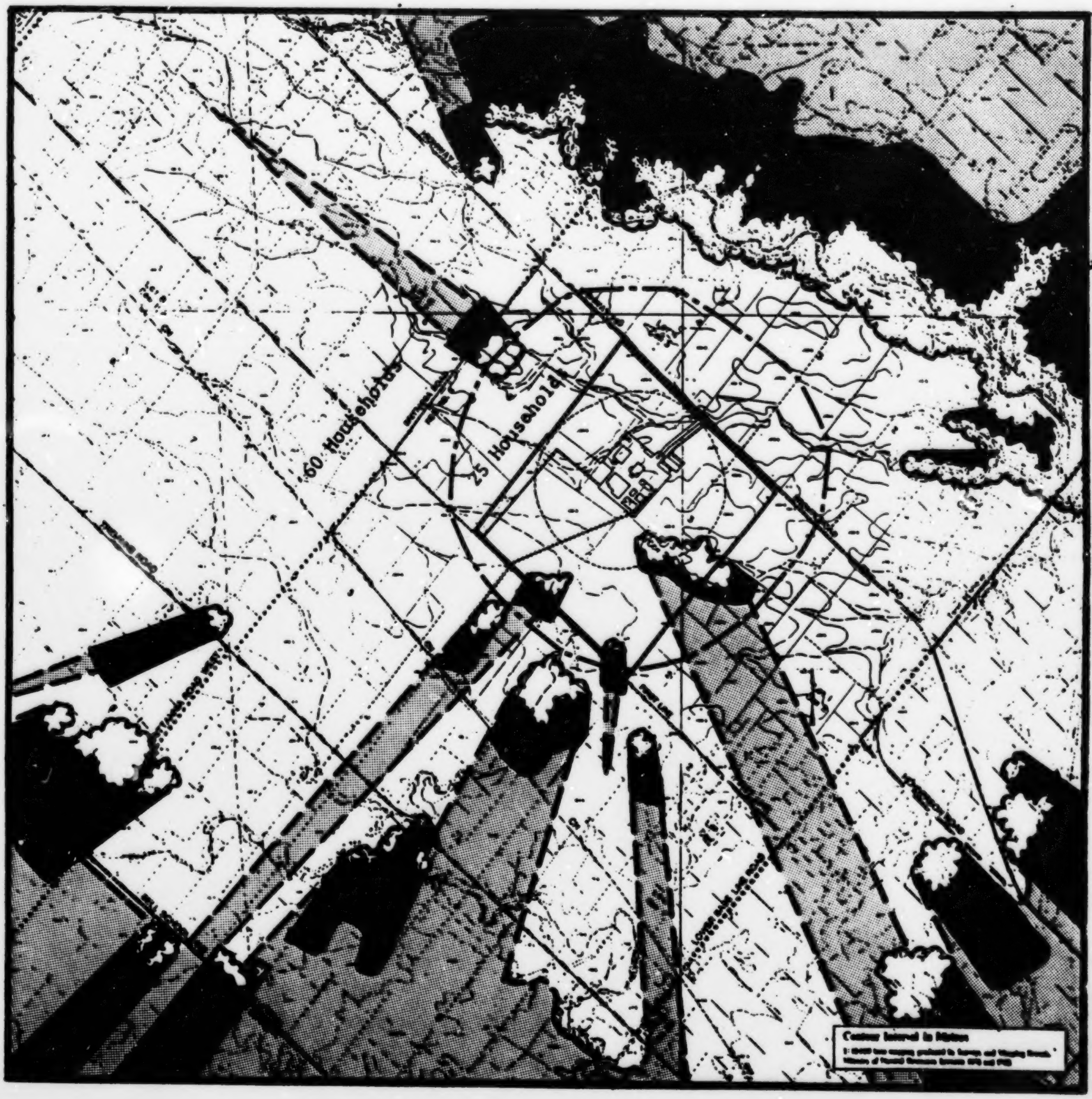
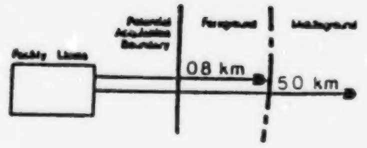

60 Households
25 Households
Contour Interval in Metres

Figure 44 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI-13N
case 2

Legend

- ▨ Existing Major Tree Masses
- ◠ View Shed Boundary
- ☐ Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▩ 45m Stack View Shadow Zone
- ▒ Facility and/or Landfill View Shadow Zone



Approx. Scale
1:30000
↑

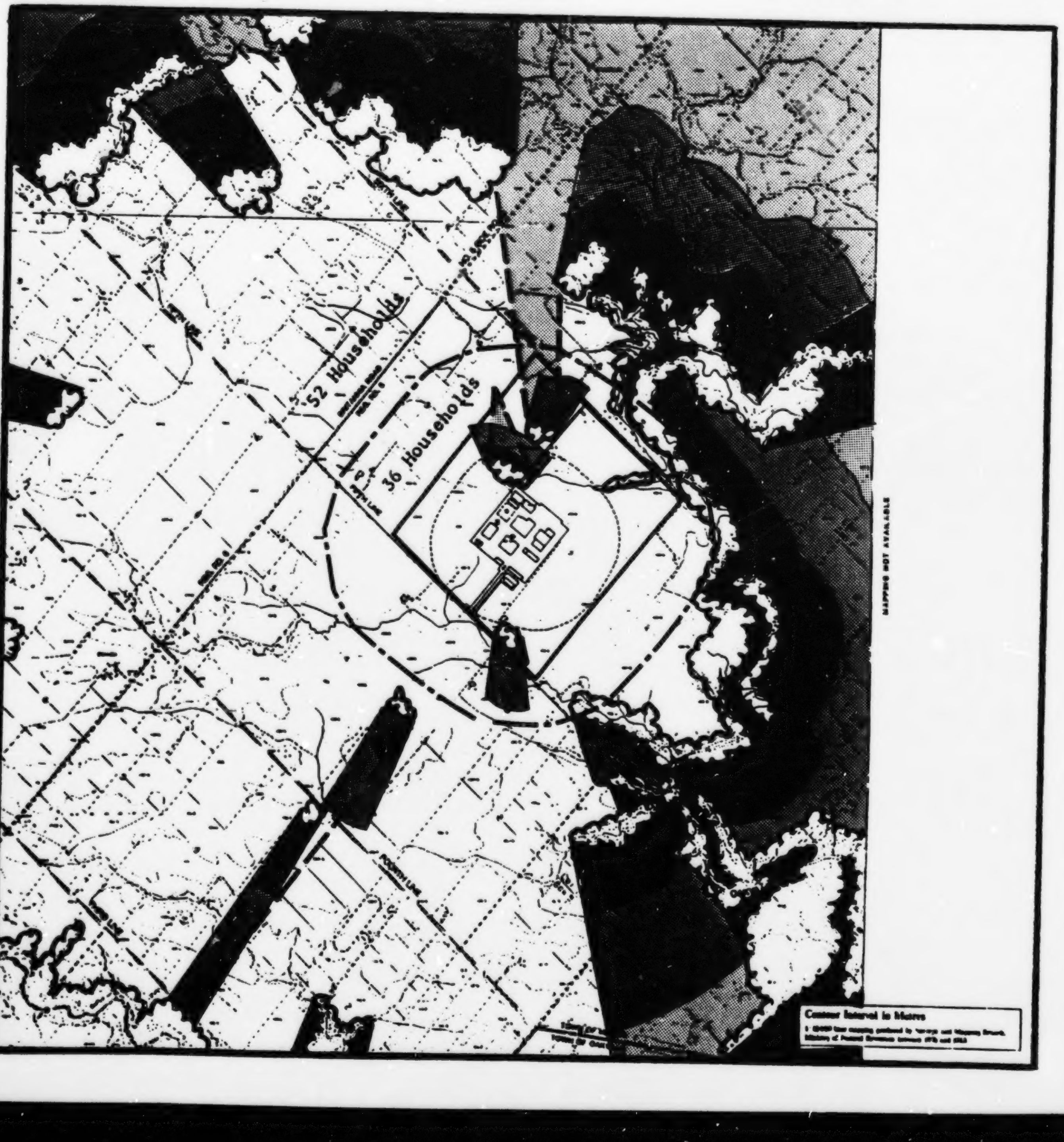

52 Households
36 Households
MAPPING NOT AVAILABLE
Contour Interval in Metres

Figure 45 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI-13N
case 3

Legend

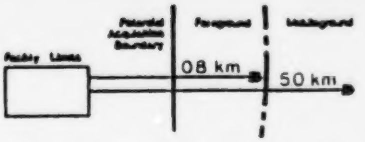
▨ Existing Major Tree Masses

▨ View Shed Boundary

☐ Area Exposed To Site Facility

■ 100m Stack View Shadow Zone

▨ Facility and/or Landfill View Shadow Zone



Approx. Scale
1:30000

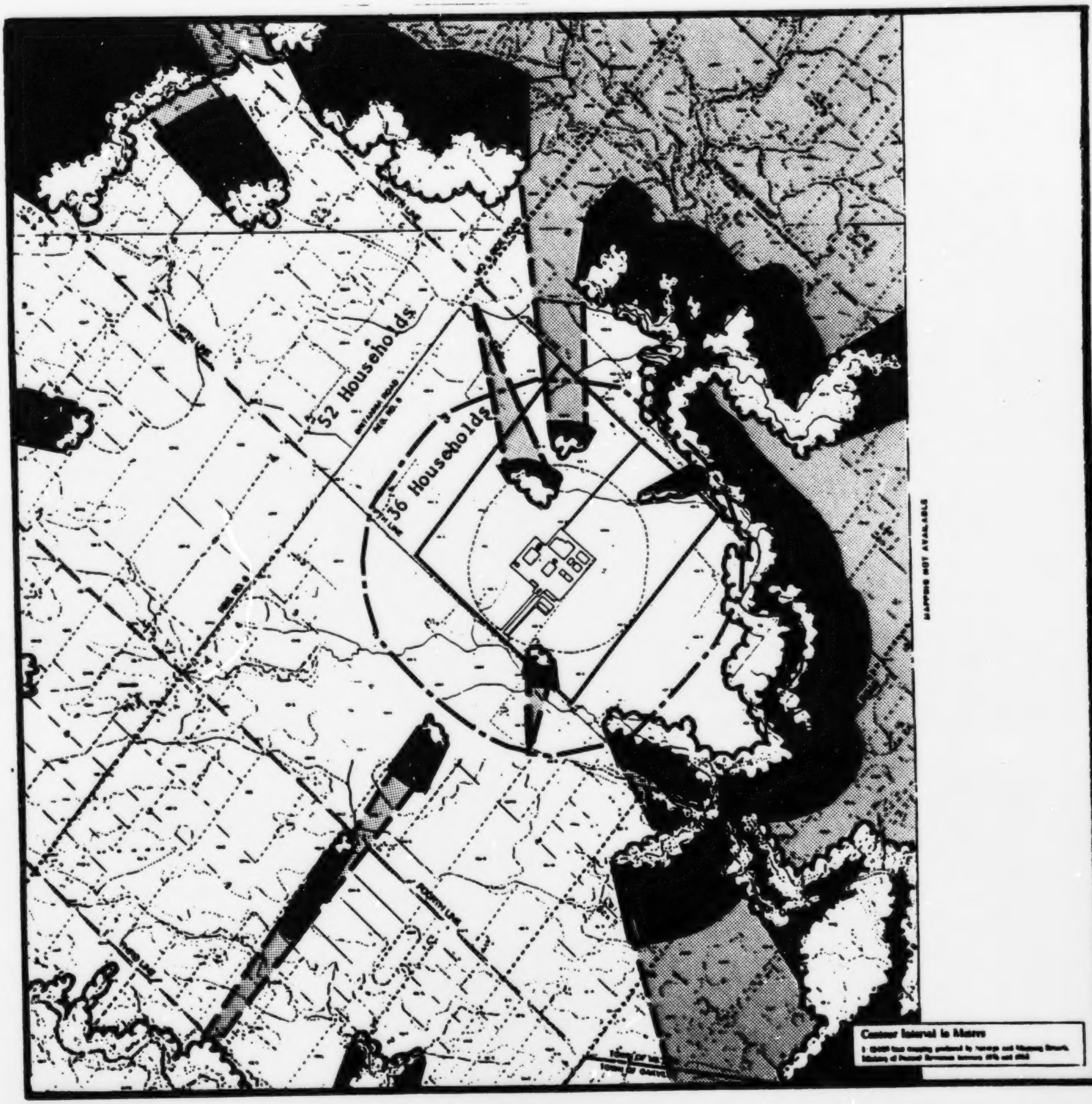
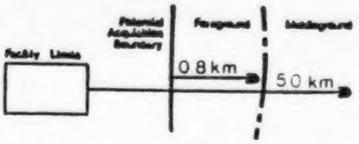

52 Households
36 Households
MAPPING NOT AVAILABLE
Contour Interval in Metres

Figure 46 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF-3C
case 1

Legend

- ▨ Existing Major Tree Masses
- ▨ View Shed Boundary
- ☐ Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▩ 45m Stack View Shadow Zone
- ▒ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8km
5.0 km

Approx. Scale
1:30000

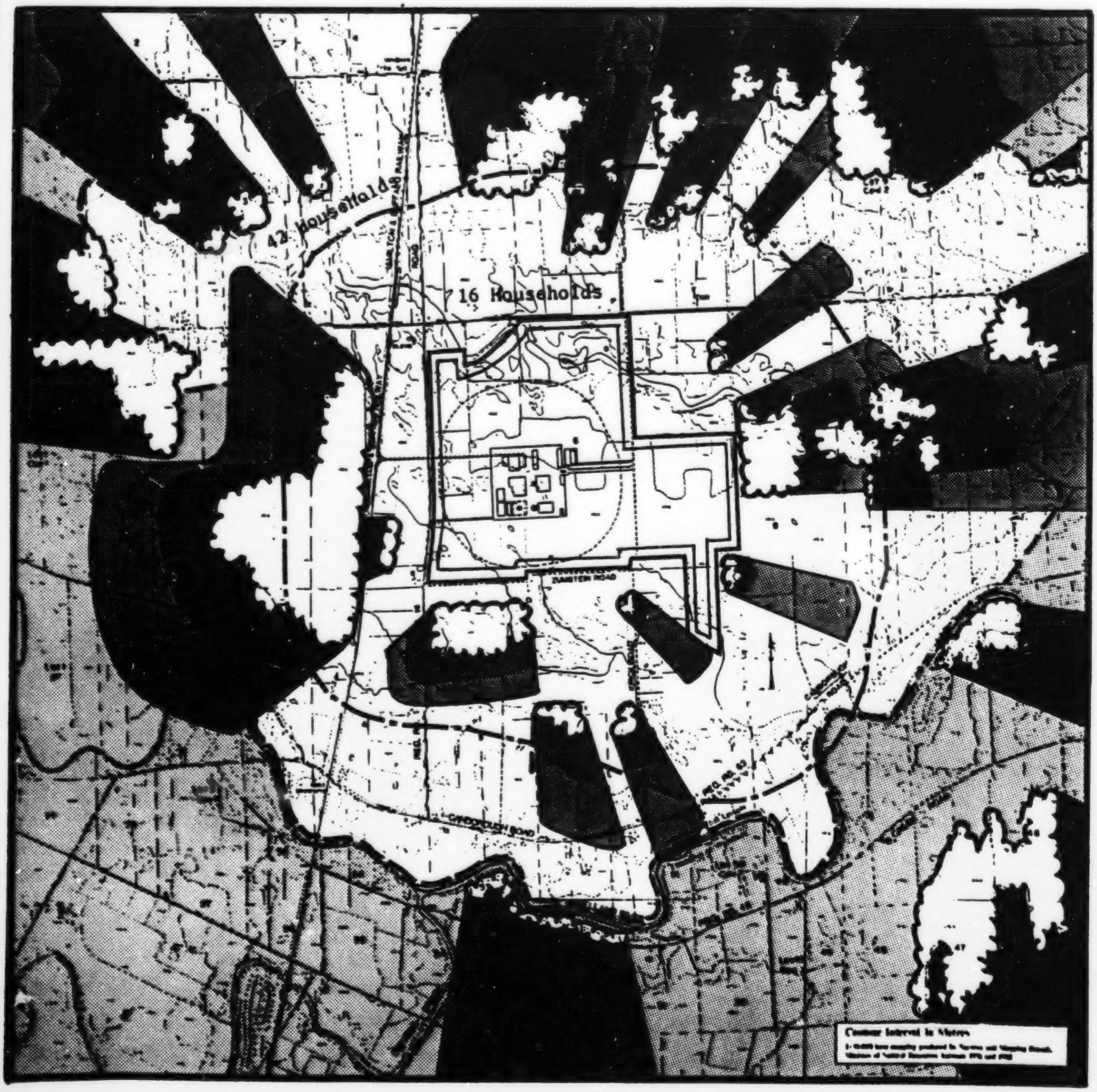

42 Household
16 Households
Contour Interval in Metres

Figure 47 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF - 9C
case 1

Legend

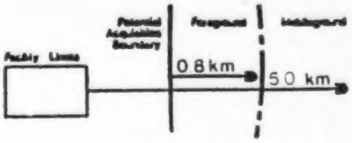
▨ Existing Major Tree Masses

▨ View Shed Boundary

☐ Area Exposed To Site Facility

■ 100m Stack View Shadow Zone

▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8km
5.0 km

Approx. Scale
1:30000

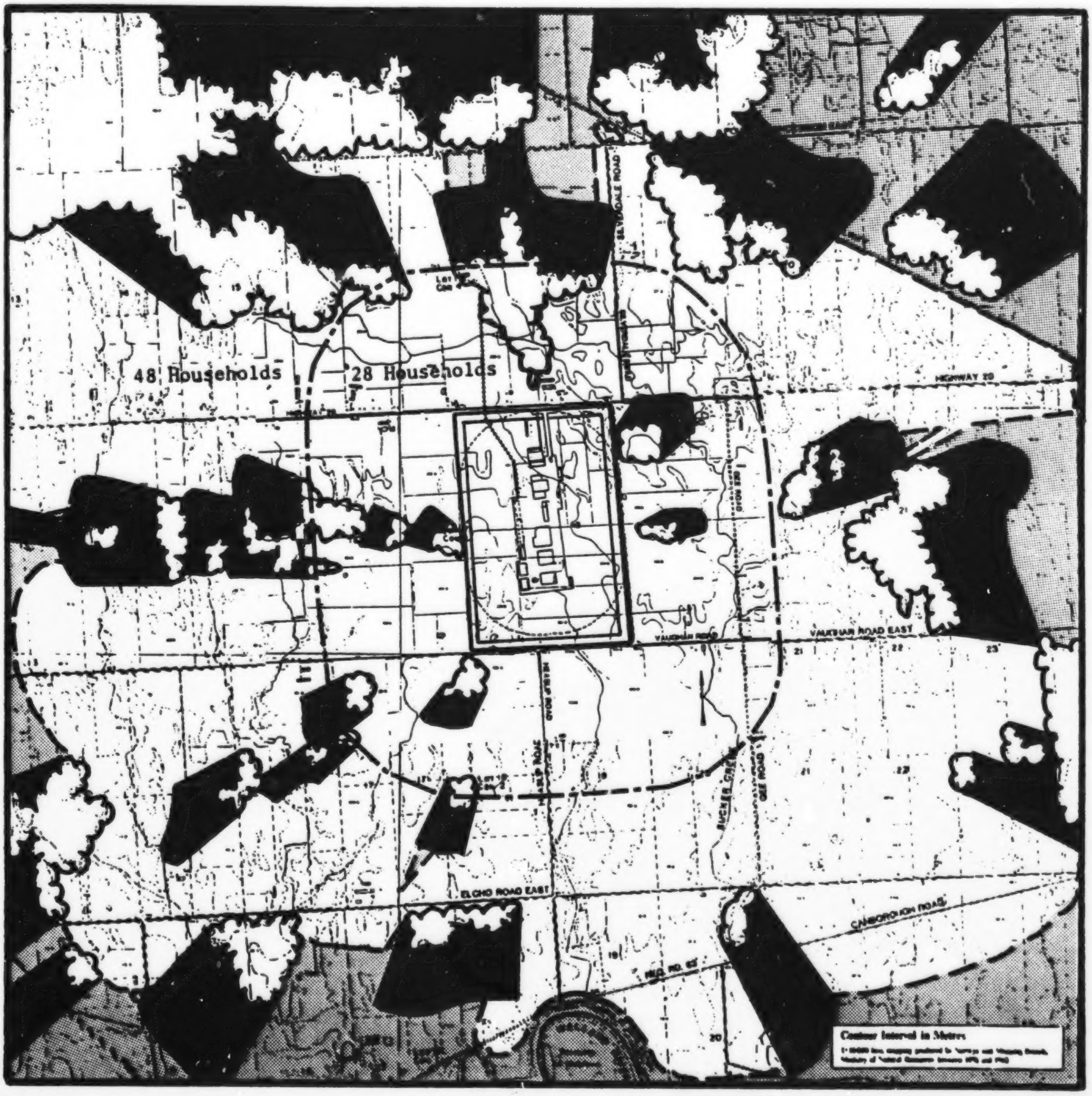
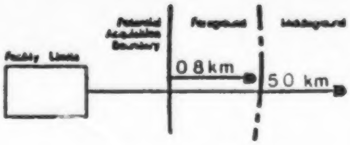

48 Households
28 Households
HIGHWAY 20
VAUGHAN ROAD EAST
VAUGHAN ROAD
SILVERDALE ROAD
ELCHO ROAD EAST
CANBOROUGH ROAD
21
22
23
Contour Interval in Metres

Figure 48 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF - 1E
case 1

Legend

- ▨ Existing Major Tree Masses
- ⌒ View Shed Boundary
- ☐ Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▩ 45m Stack View Shadow Zone
- ▒ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0 8 km
5 0 km

Approx. Scale
1:30000

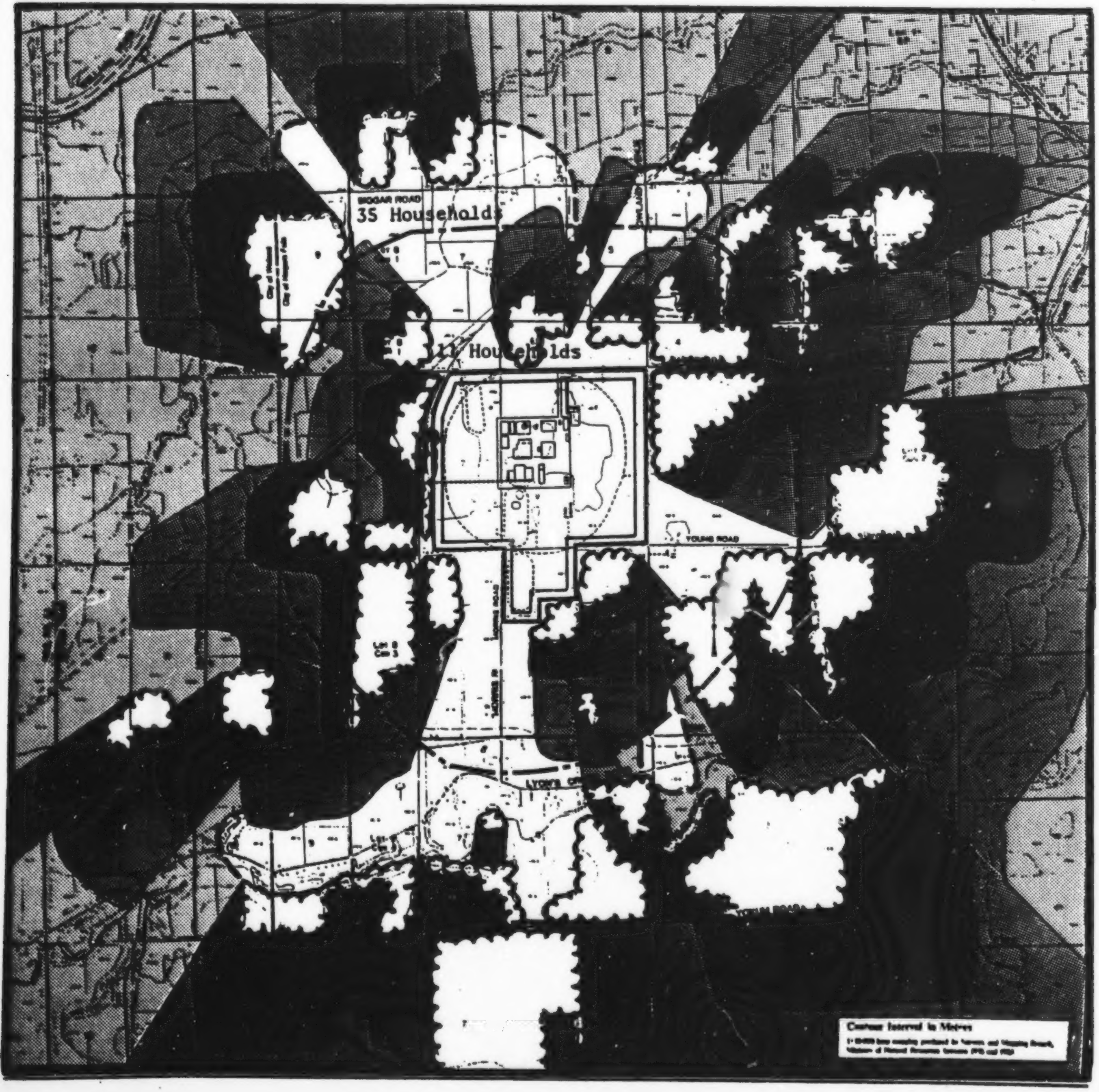
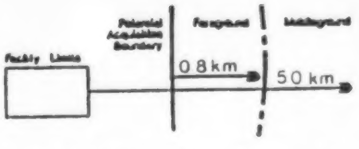

35 Households
11 Households
YOUNG ROAD
Contour Interval in Metres

Figure 49 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF-1E
case 2

Legend

- ▨ Existing Major Tree Masses
- ☐ Area Exposed To Site Facility
- ⁄ View Shed Boundary
- ▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8 km
5.0 km

Approx. Scale
1:30000

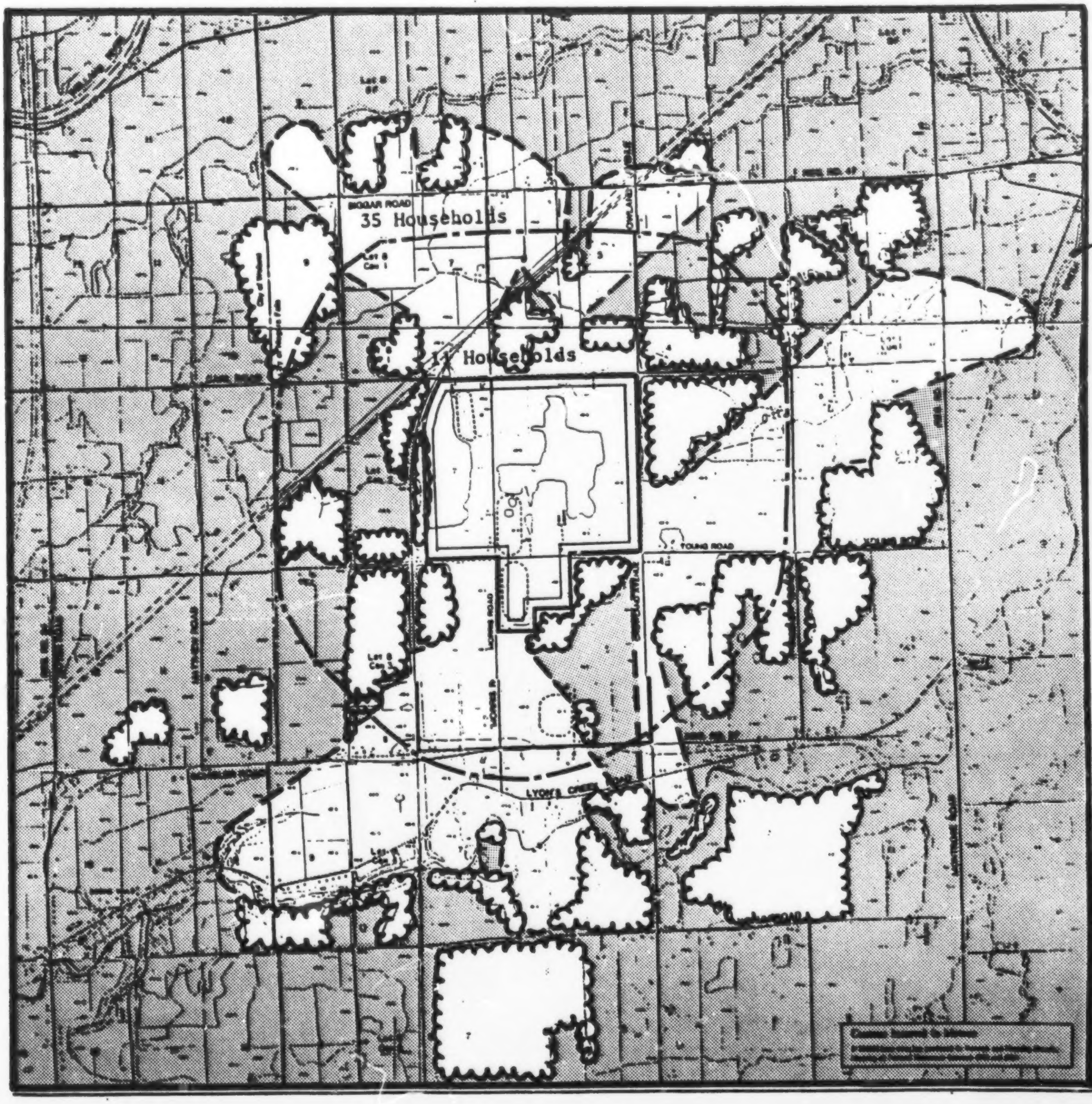
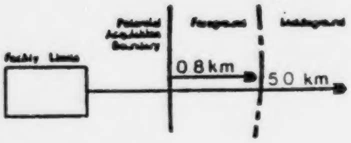

BIGGAR ROAD
35 Households
11 Households
YOUNG ROAD
LYON'S CREEK ROAD

Figure 50 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

LF-1E
case 3

Legend

- ▢ Existing Major Tree Masses
- ▢ View Shed Boundary
- ▢ Area Exposed To Site Facility
- ▩ 45m Stack View Shadow Zone
- ▨ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
0.8km
5.0 km

Approx. Scale
1:30000 ↑

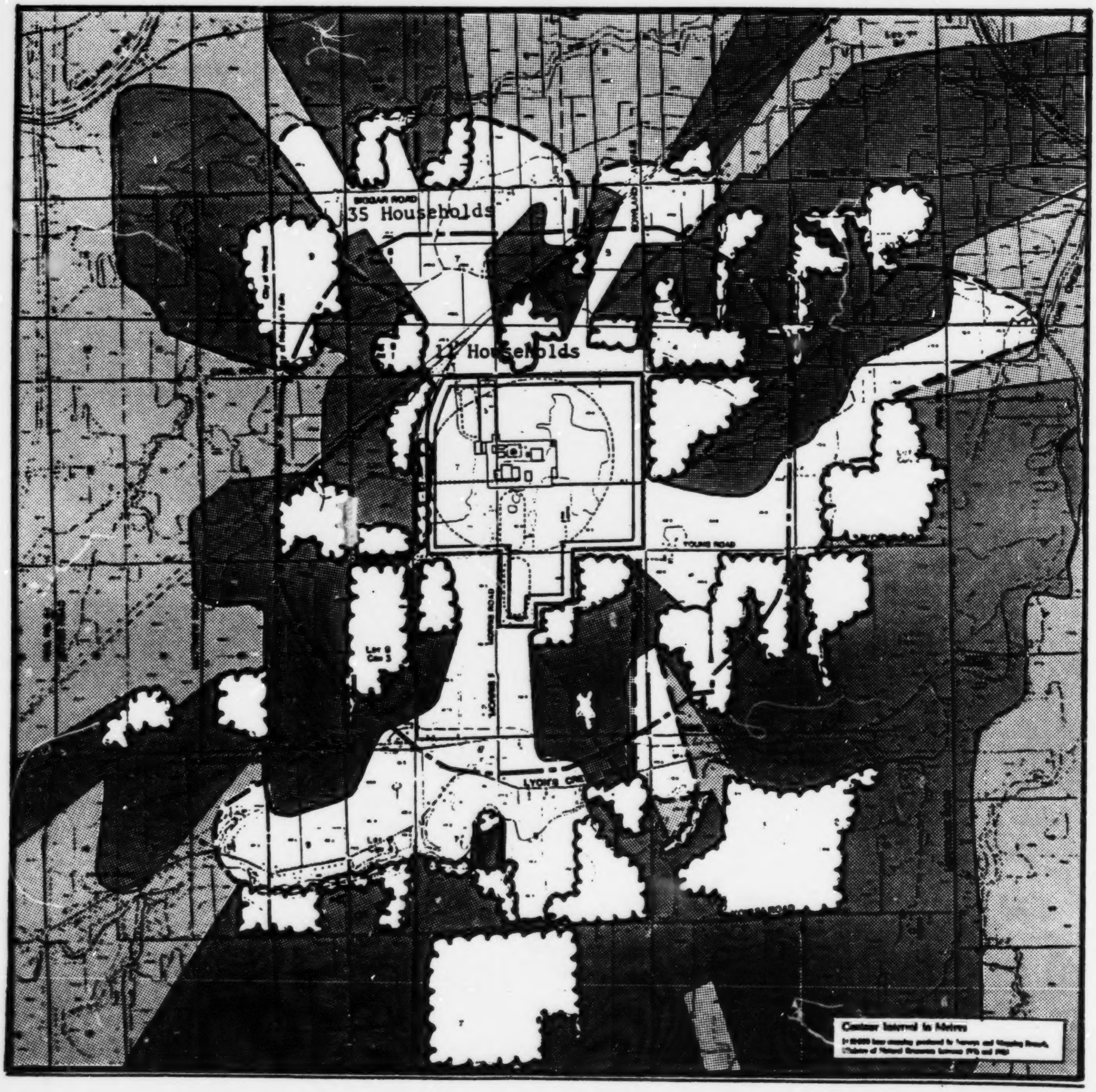

35 Households
11 Households
BIGGAR ROAD
YOUNG ROAD
LYONS CREEK
Contour Interval In Metres

Figure 51 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI - 27E
case 2

Legend

Existing Major Tree Masses

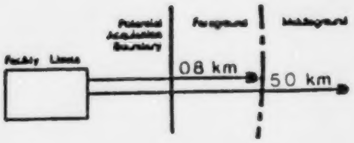
View Shed Boundary

☐ Area Exposed To Site Facility

■ 100m Stack View Shadow Zone

▨ 45m Stack View Shadow Zone

░ Facility and/or Landfill View Shadow Zone


Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
08 km
50 km

Approx. Scale
1:30000

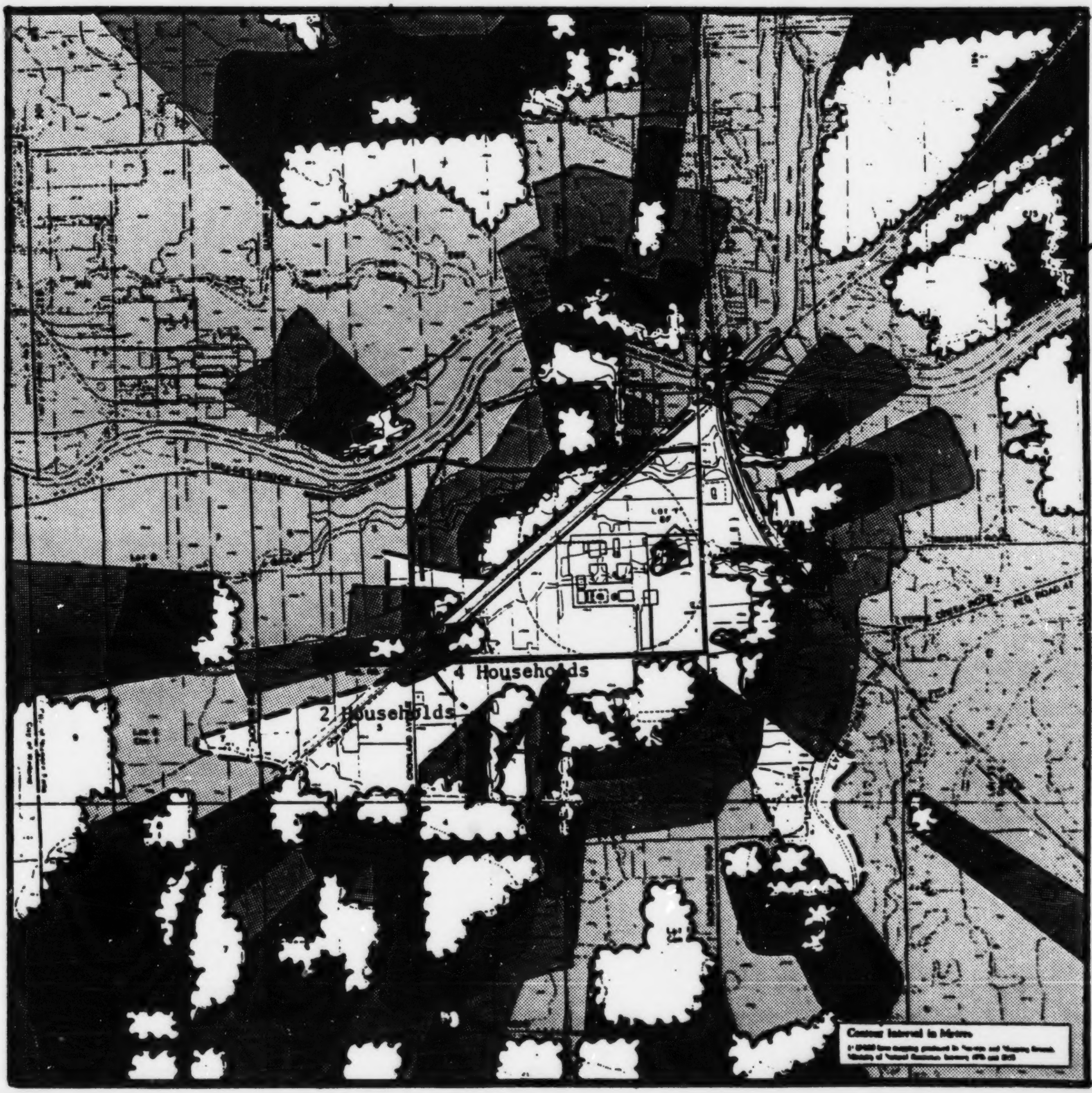
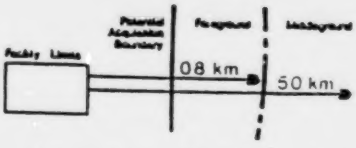

4 Households
2 Households
Contour Interval in Metres

Figure 52 Visual Intrusion of Site Facility on Surrounding Households (Resident Viewer)

PI - 27E
case 3

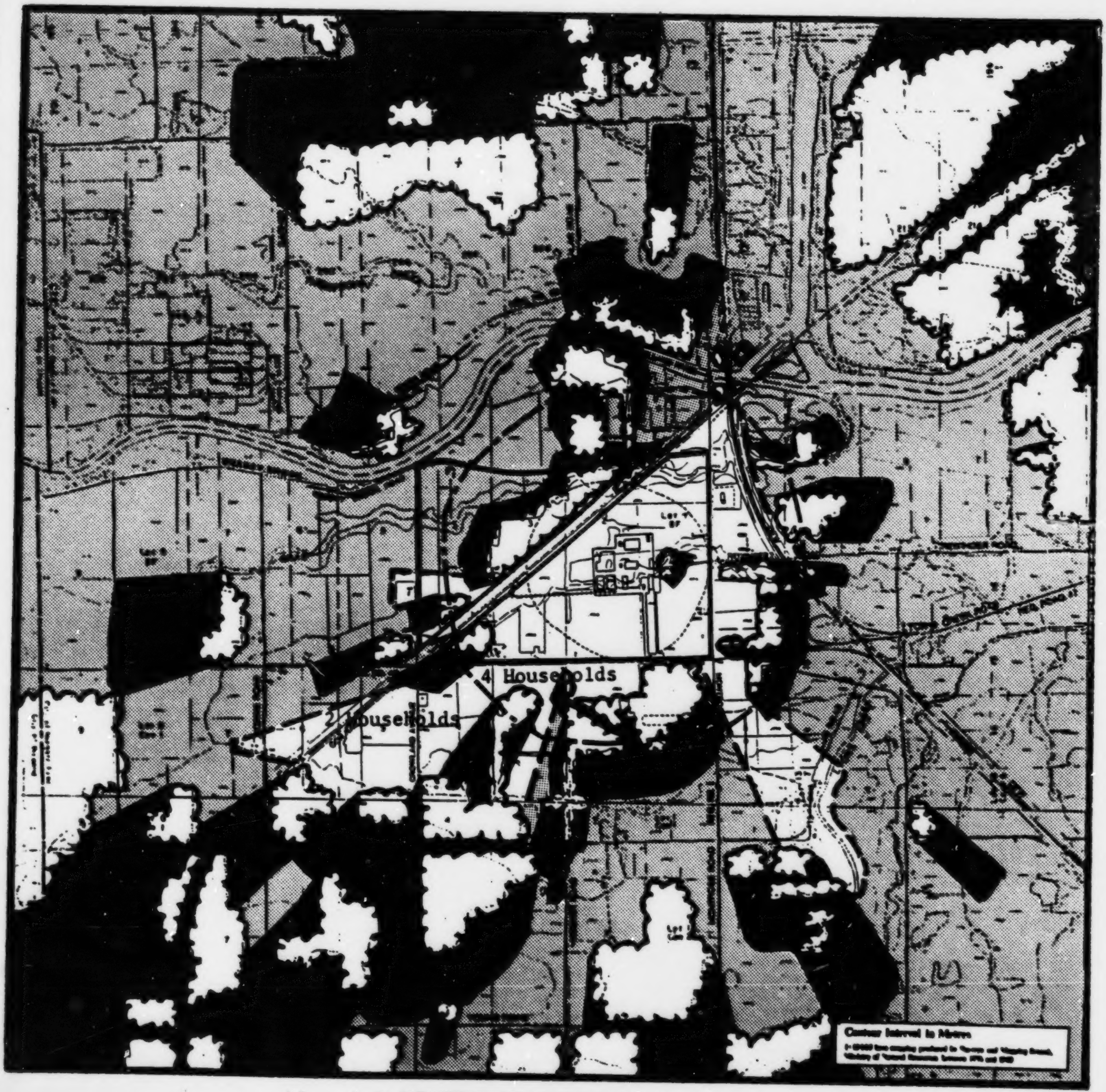
Legend

- Existing Major Tree Masses
- View Shed Boundary
- □ Area Exposed To Site Facility
- ■ 100m Stack View Shadow Zone
- ▨ Facility and/or Landfill View Shadow Zone



Facility Limits
Potential Acquisition Boundary
Foreground
Middleground
08 km
50 km

Approx. Scale
1:30000



4 Households
2 Households
Contour Interval in Metres

Mitigative Recommendations

This analysis defined the extent of visual mitigation required at each site and for each case. The appropriate techniques previously identified, could be used to minimize visual impacts in the surrounding areas of each site. The only views which were seen as being more difficult to screen would be those from the special viewing locations since they were above ground level. In addition, it was assumed that due to the large scale, the proposed stack (100m) could not be effectively screened.

The indicator which was identified and evaluated for this analysis was the length of open site boundary requiring screening treatments. The basis for this was that major existing vegetation would be maintained where possible depending on the case and site within the acquisition boundary, but only within the 50 meter buffer area.

Existing major vegetation masses along boundaries would provide screening of the facility. However, boundaries with no major existing vegetation masses would require new visual screening utilizing predominantly landscape techniques. It was assumed that sites requiring the least amount of new screening would be preferred to those requiring major amounts of screening.

For the purposes of this analysis, potential visual screening requirements were limited to within the actual site boundaries. No additional mitigation outside the site was taken into account, though this may be a possibility at a more detailed level of analysis when actual visual screening treatments are design. This level of consideration, however, was beyond the scope of this study. The approach used in this analysis was adequate to provide relative rankings of the siting options.

Table 11 summarizes the total length of boundary at each site requiring screening.

Table 12 summarizes the combined length of boundary requiring screening for each siting option.

Siting option LF-1E was clearly identified as having the least amount of visual screening potentially required due to the extent of existing screening both on and off the site. Option LF-9C had the second smallest amount of visual screening potentially required but approximately 50% more than LF-1E. Options LF-3C and LF-1E/PI-27E followed and were closely ranked but each potentially required approximately twice as much visual screening as LF-1E. The other partially integrated siting options potentially required far more extensive visual screening.

TABLE 11 - Length of Site Boundary Requiring Visual Screening (by site and case)

Site	Case	Total length of site boundary requiring visual mitigation screenings
LF-4N	2	3350m.
LF-4N	3	4250m.
LF-3C	1	4125m.
LF-9C	1	3350m.
LF-1E	1	2050m.
LF-1E	2	2050m.
LF-1E	3	2050m.
PI-13N	2	3350m.
PI-13N	3	3300m.
PI-1N	2	3300m.
PI-1N	3	3300m.
PI-27E	2	2250m.
PI-27E	3	2250m.

TABLE 12- Length of Site Boundary Requiring Visual Screening for Each Siting Option

Siting Option	Case	Length of Boundary Requiring Mitigation
LF-1E and PI-27E	2	4300m.
	3	4300m.
LF-4N and PI-1N	2	6650m.
	3	7550m.
LF-4N and PI-13N	2	6700m.
	3	7550m.
LF-3C	1	4125m.
LF-9C	1	3325m.
LF-1E	1	2050m.

The following ranking summarizes the order of preference for the siting options:

	Rank	Siting Option	Case
Minimum amount of mitigation required	1	LF-1E	1
	2	LF-9C	1
	3	LF-3C	1
	4	LF-1E and PI-27E	2 and 3
	5	LF-4N and PI-1N	2
Maximum amount of mitigation required	6	LF-4N and PI-13N	2
	7	LF-4N and PI-1N/ LF-4N and PI-13N	3/ 3

Mitigative Priorities

The mitigation assessment was carried further to identify priorities for visual screening and associated cost factors.

The first step in this analysis was to assign each site boundary an appropriate priority.

Priorities for screening were subdivided into three categories: high, medium and low. Priority areas were identified based on numbers of potential viewers (households and traffic) adjacent to site boundaries from the previous analyses. High priority zones were defined as those having high numbers of potential viewers on an exposed boundary. Medium priority zones were defined as having fewer potential viewers on an exposed boundary and low priority zones as having only few or no viewers on an exposed boundary.

The second step was to combine the site boundary priorities to identify the siting option priorities for high and medium levels. Low priority boundaries were not included in this analysis since they were not as significant as the high and medium levels.

Table 13 summarizes the length of high and medium priority boundaries requiring screening treatment for each site and case.

Table 14 summarizes the total length of high and medium priority zone boundaries by siting option.

Although actual costs of mitigative treatments were not calculated at this time, theoretical costs factors were identified based on priority. It was assumed that high priority zones would require more emphasis and hence greater amounts and quality of screening treatments. This would incur greater costs than medium priority zones. For the purposes of this level of assessment it was assumed that high priority zones would require mitigation treatment on the order of twice the per unit cost of medium priority zones. A cost factor of 2X was then established for high priority zones and 1X for medium priority zones. No cost factor was assigned to low priority zones. The theoretical cost factors were found by the following technique:

Theoretical Cost Factor = (2 x length of high priority boundary)
plus
(1 x length of medium priority boundary)

These cost factor assumptions were based on possible typical landscape screening techniques. However, the actual recommended treatments have not been identified and are therefore not costed. There is no intention to identify these factors as costs. The results of this analysis represent only comparative results for ranking the siting options.

Table 15 summarizes the priorities for visual mitigation for each siting option based on theoretical cost factors.

Figures 53 through 65 illustrate the priority zones for each site.

The results of this analysis clearly indicate that the integrated siting option, LF-1E, has the least amount of high and medium priority boundaries. Option LF-9C is closely ranked with somewhat higher amounts of visual screening priority boundary. Option LF-3C then has greater amounts of screening priorities.

The partially integrated siting option with the least amount of priorities for visual screening is LF-1E/PI-27E. This siting option has approximately twice as much high and medium priority boundary requiring screening as the best fully integrated option LF-1E. This would appear to be due to the inherently greater boundary length and associated priorities with having two sites. The other partially integrated siting options contained far greater amounts of high and medium priority boundary than the previously mentioned options.

Siting options with the least relative cost factor were identified as being preferable to siting options having higher relative mitigative cost factor.

Based on this assessment, the following ranking was established for the siting options based on priorities of mitigation and theoretical cost factors.

	Rank	**Siting Option**	**Case**
Least amount of priority mitigation required	1	LF-1E	1
	2	LF-9C	1
	3	LF-3C	1
	4	LF-1E and PI-27E	2 and 3
Greatest amount of priority mitigation required	5	LF-4N and PI-1N	2
	6	LF-4N and PI-13N	2
	7	LF-4N and PI-1N LF-4N and PI-13N	3 3

TABLE 13 - Length of High and Medium Priority Zone Boundaries (by site and case)

site	length of boundary along high priority zone	length of boundary along medium priority zone
LF-4N (case 2)	2150m.	1200m.
LF-4N (case 3)	2150m.	2100m.
LF-3C (case 1)	1625m.	2500m.
LF-9C (case 1)	1450m.	1900m.
LF-1E (case 1)	2050m	---
LF-1E (case 2)	2050m.	---
LF-1E (case 3)	2050m.	---
PI-13N (case 2)	1350m.	2000m.
PI-13N (case 3)	1300m.	2000m
PI-1N (case 2)	1200m	2100m.
PI-1N (case 3)	1200m	2100m.
PI-27E (case 2)	2250m.	---
PI-27E (case 3)	2250m.	---

TABLE 14 - Total Length of High and Medium Priority Zone Boundaries (by siting option)

site	total length of high priority zone boundaries	total length of medium priority zone boundaries
LF-1E and PI-27E (case 2)	4300m.	0m.
LF-1E and PI-27E (case 3)	4300m.	0m.
LF-4N and PI-1N (case 2)	3350m.	3300m.
LF-4N and PI-1N (case 3)	4250m.	3300m.
LF-4N and PI-13N (case 2)	3350m.	3350m.
LF-4N and PI-13N (case 3)	4250m.	3300m.
LF-3C (case 1)	1625m.	2500m.
LF-9C (case 1)	1450m.	1900m.
LF-1E (case 1)	2050m.	0m.

TABLE 15 - Priorities for Visual Mitigation

Siting Option	Case	High Priority Boundary Length	Cost Factor	Sub-Total	Medium Priority Boundary Length	Cost Factor	Sub-Total	Total Relative Cost
LF-1E & PI-27E	2&3	4300m.	2x	8,600	0m.	1x	0	8,600
LF-4N & PI-1N	2	3350m.	2x	6,700	3300m.	1x	3,300	10,000
	3	4250m.	2x	8,500	3300m.	1x	3,300	11,800
LF-4N& PI-13N	2	3350m.	2x	6,700	3350m	1x	3,350	10,050
	3	4250m.	2x	8,500	3300m.	1x	3,300	11,800
LF-3C	1	1625m.	2x	3,250	2500m.	1x	2,500	5,750
LF-9C	1	1450m.	2x	2,900	1900m.	1x	1,900	4,800
LF-1E	1	2050m.	2x	4,100	0m.	1x	0	4,100

Figure 53 Proposed Mitigation Priority Zones

LF-4N
case 2

Legend

■ High Priority Zone

▨ Priority Zone

⬚ Low Priority Zone

▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale ↑
1:15000

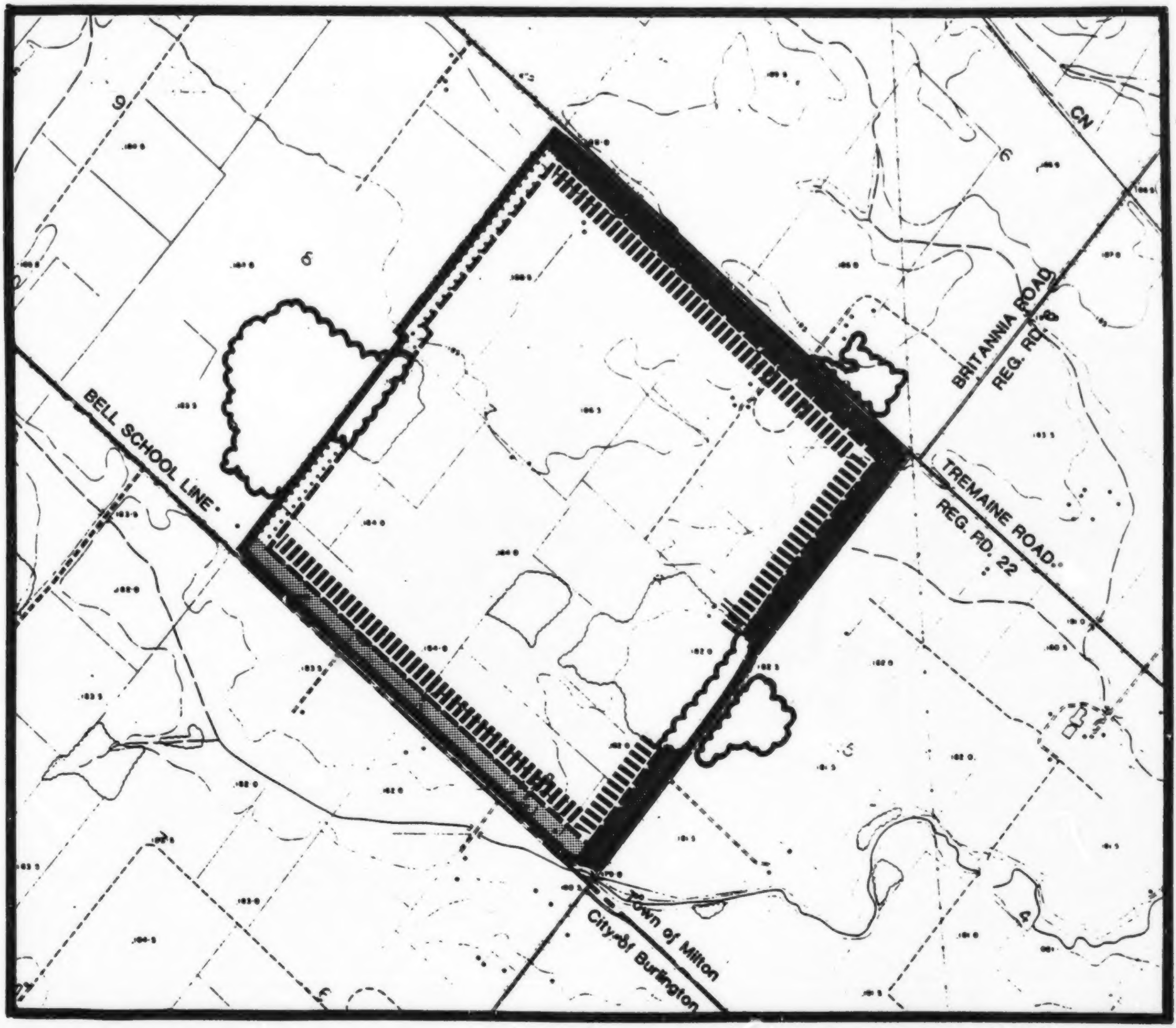

CN
BRITANNIA ROAD
REG. RD. 6
BELL SCHOOL LINE
TREMAINE ROAD
REG. RD. 22
Town of Milton
City of Burlington

Figure 54 Proposed Mitigation Priority Zones

# LF-4N
case 3

Legend

■ High Priority Zone

▨ Priority Zone

⬚ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale 1:15000 ↑

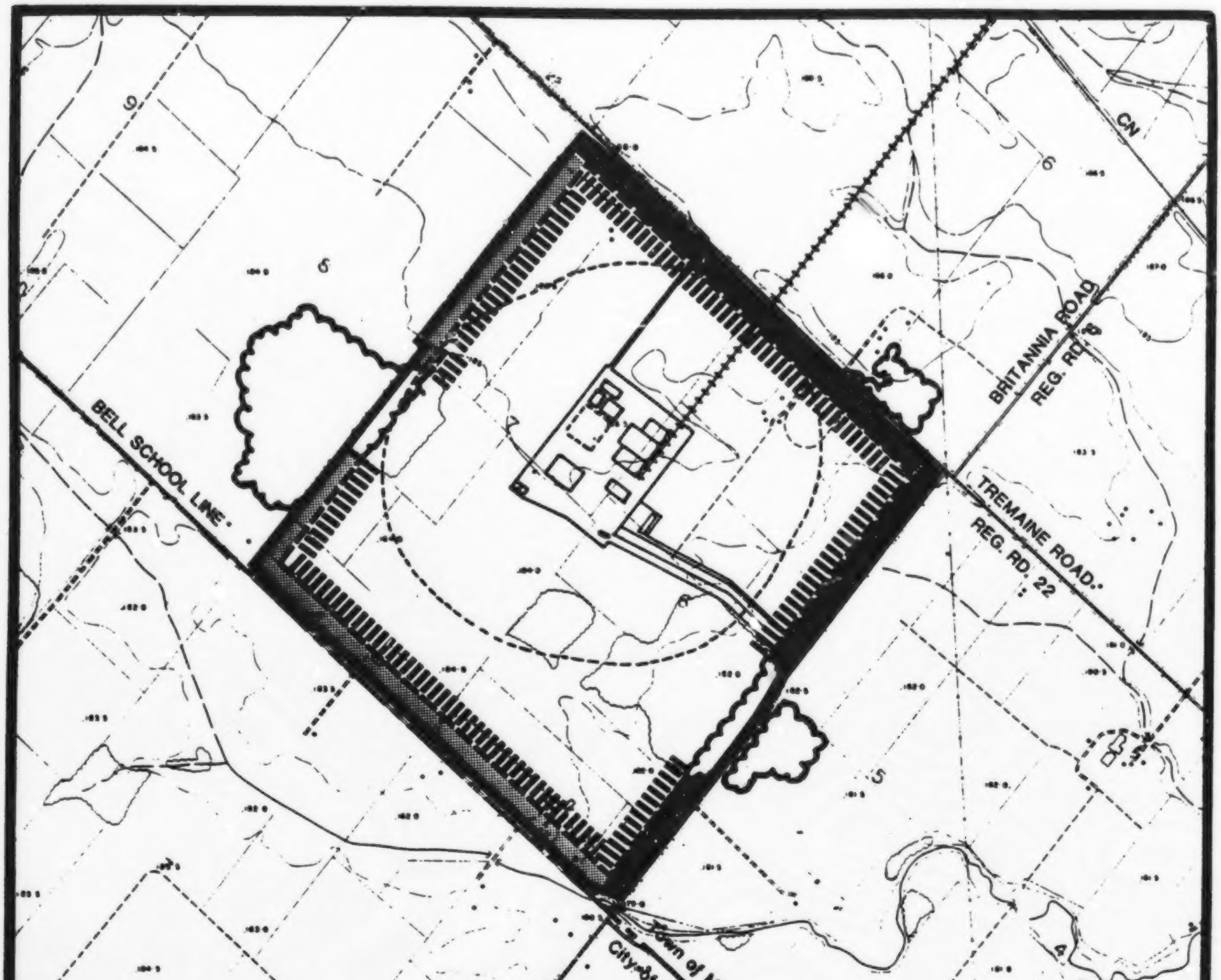

9
6
CN
6
BRITANNIA ROAD
REG. RD. 6
BELL SCHOOL LINE
TREMAINE ROAD
REG. RD. 22
5
4
Town of Milton
City of Burlington

Figure 55 Proposed Mitigation Priority Zones

PI-1N
case 3

Legend

■ High Priority Zone

▨ Priority Zone

⁙ Low Priority Zone

|||||||| Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale
1:15000
↑

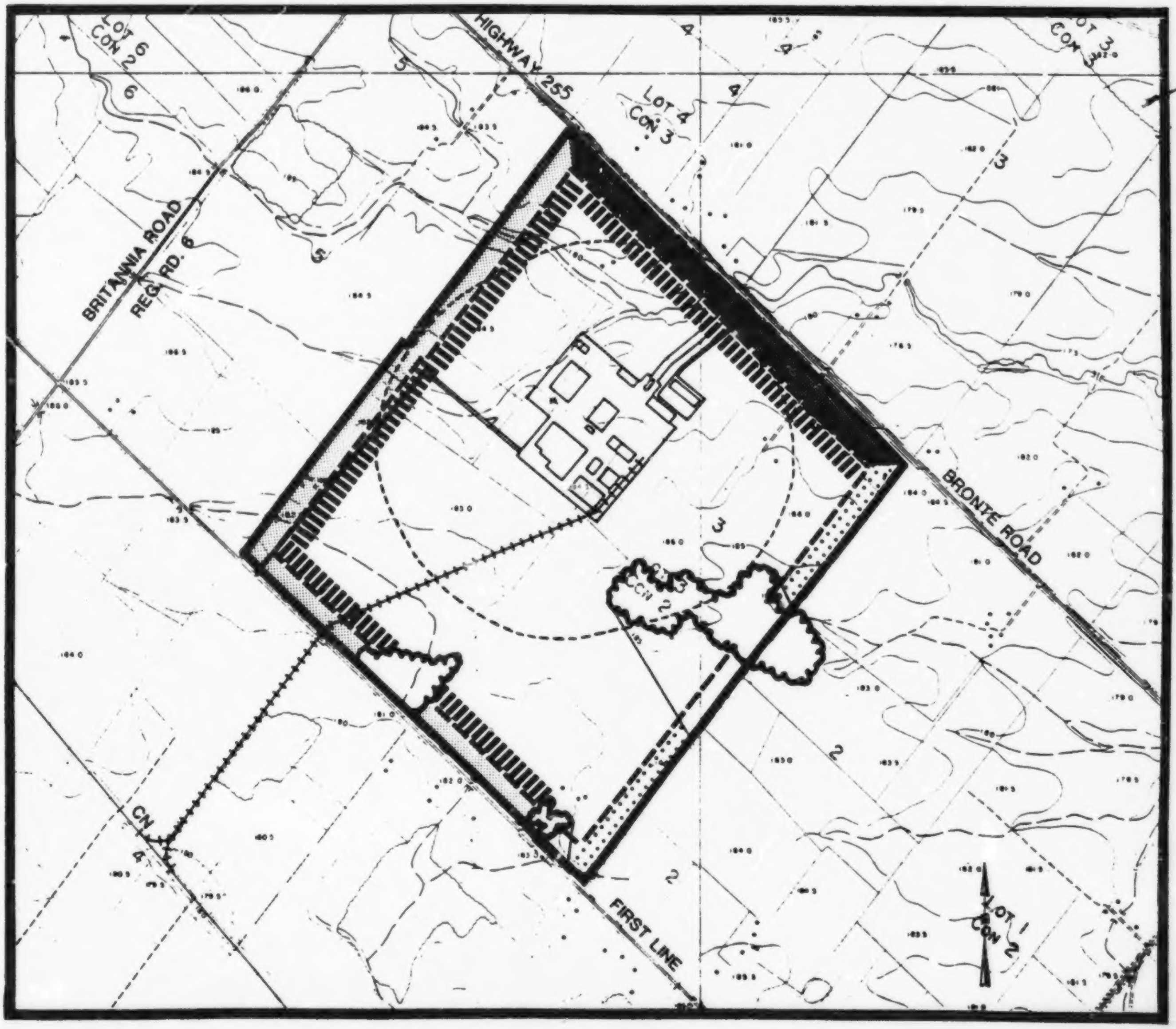

LOT 6
CON 2
6
5
HIGHWAY 255
LOT 4
CON 3
4
3
LOT 3
CON 3
BRITANNIA ROAD
REG. RD. 6
BRONTE ROAD
LOT 3
CON 2
2
CN
4
FIRST LINE
LOT 1
CON 2

Figure 56 Proposed Mitigation Priority Zones

PI-1N
case 2

Legend

■ High Priority Zone

▨ Priority Zone

⁙ Low Priority Zone

▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale ↑
1:15000

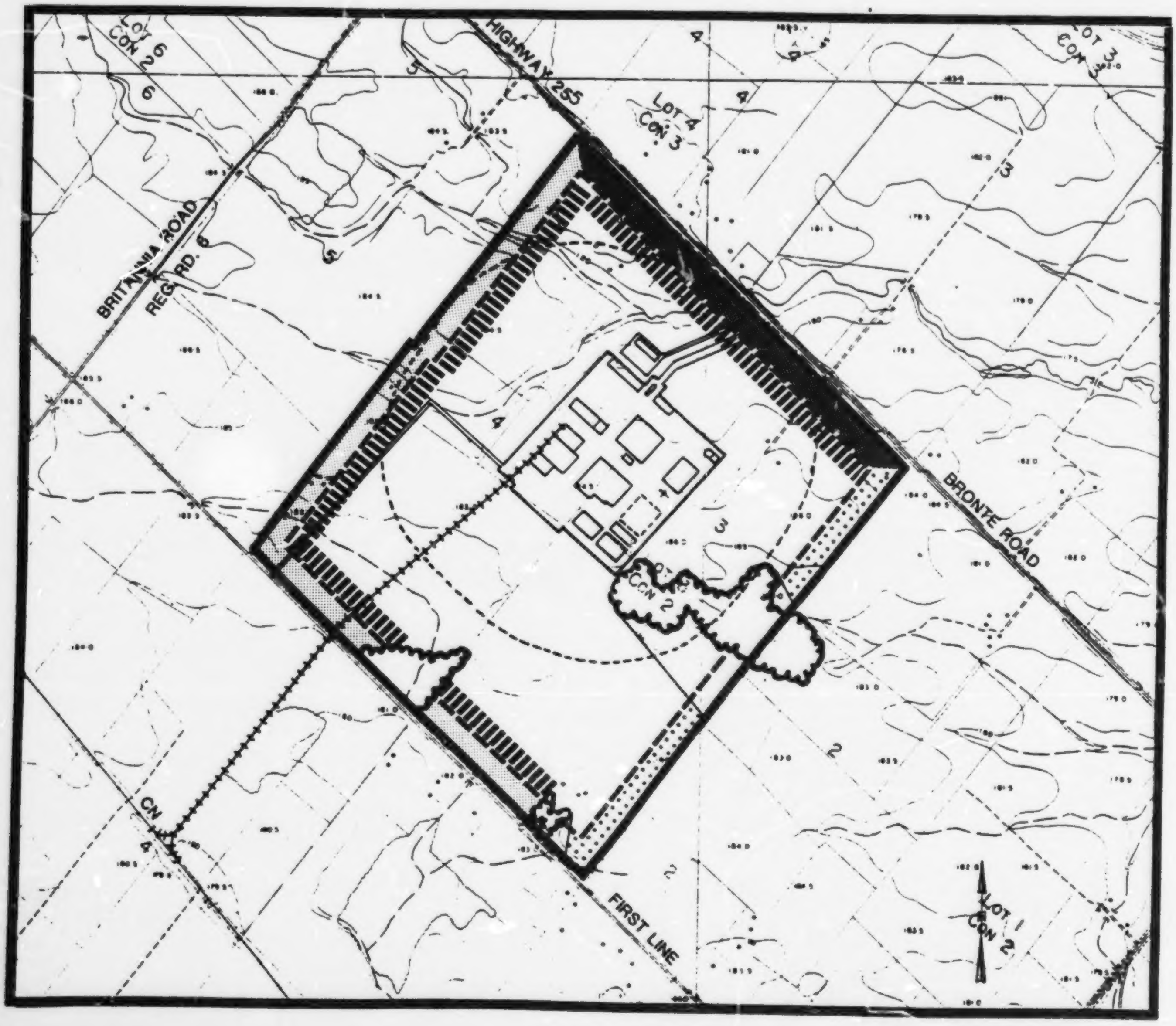

LOT 6
CON 2
6
5
HIGHWAY 255
4
LOT 4
CON 3
4
LOT 3
CON 3
3
BRITANNIA ROAD
REG. RD. 6
4
3
LOT 2
CON 2
BRONTE ROAD
2
CN
4
FIRST LINE
2
LOT 1
CON 2

Figure 57 Proposed Mitigation Priority Zones

PI-13N
case 3

Legend

■ High Priority Zone

▨ Priority Zone

⁙ Low Priority Zone

▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale 1:15000 ↑

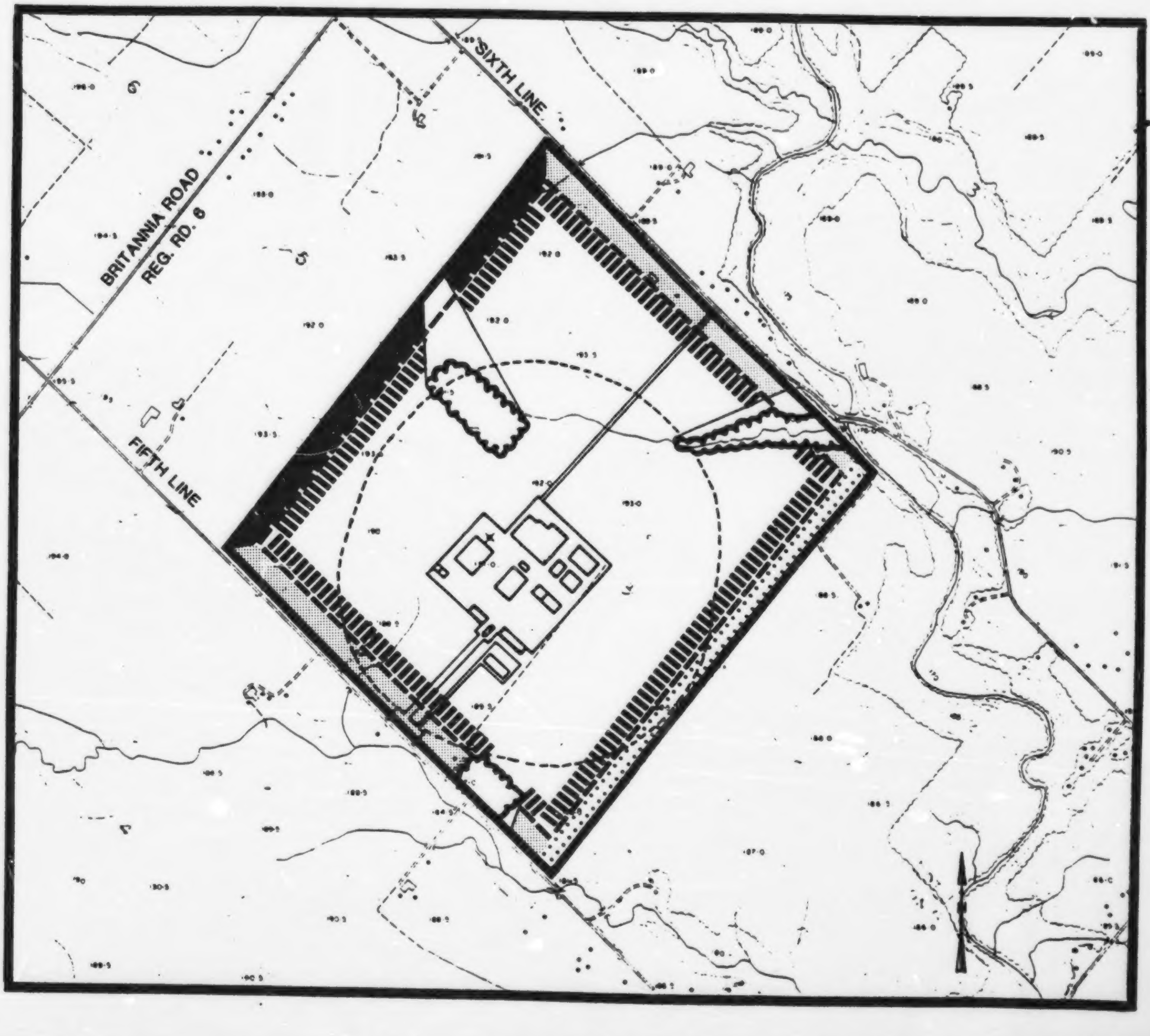

SIXTH LINE
BRITANNIA ROAD
REG. RD. 6
FIFTH LINE

Figure 58 Proposed Mitigation Priority Zones

PI-13N
case 2

Legend

■ High Priority Zone

▨ Priority Zone

░ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale ↑
1:15000

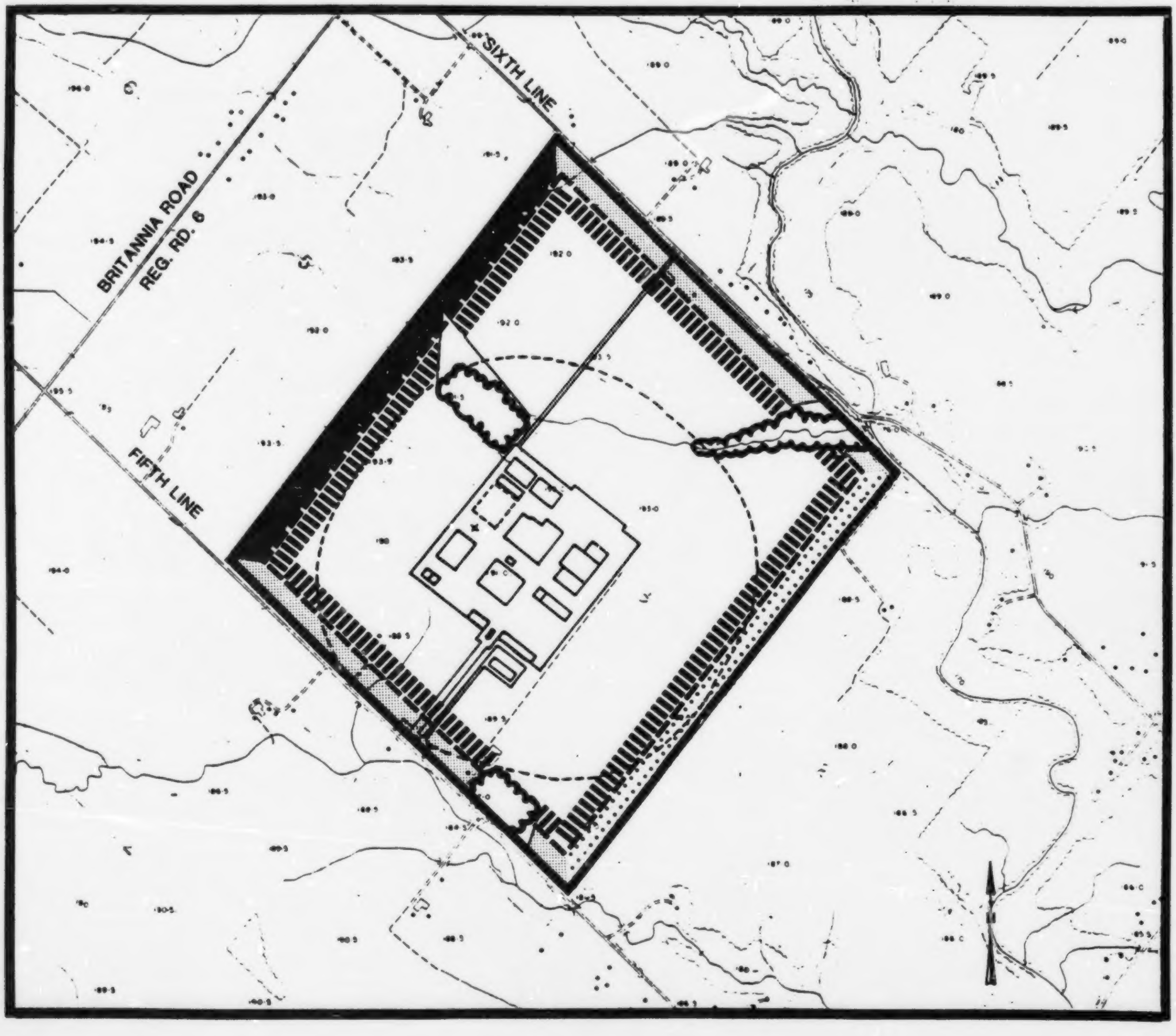

SIXTH LINE
BRITANNIA ROAD
REG. RD. 6
FIFTH LINE

Figure 59 Proposed Mitigation Priority Zones

LF-3C
case 1

Legend

■ High Priority Zone

▨ Priority Zone

⁘ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale
1:15000 ↑

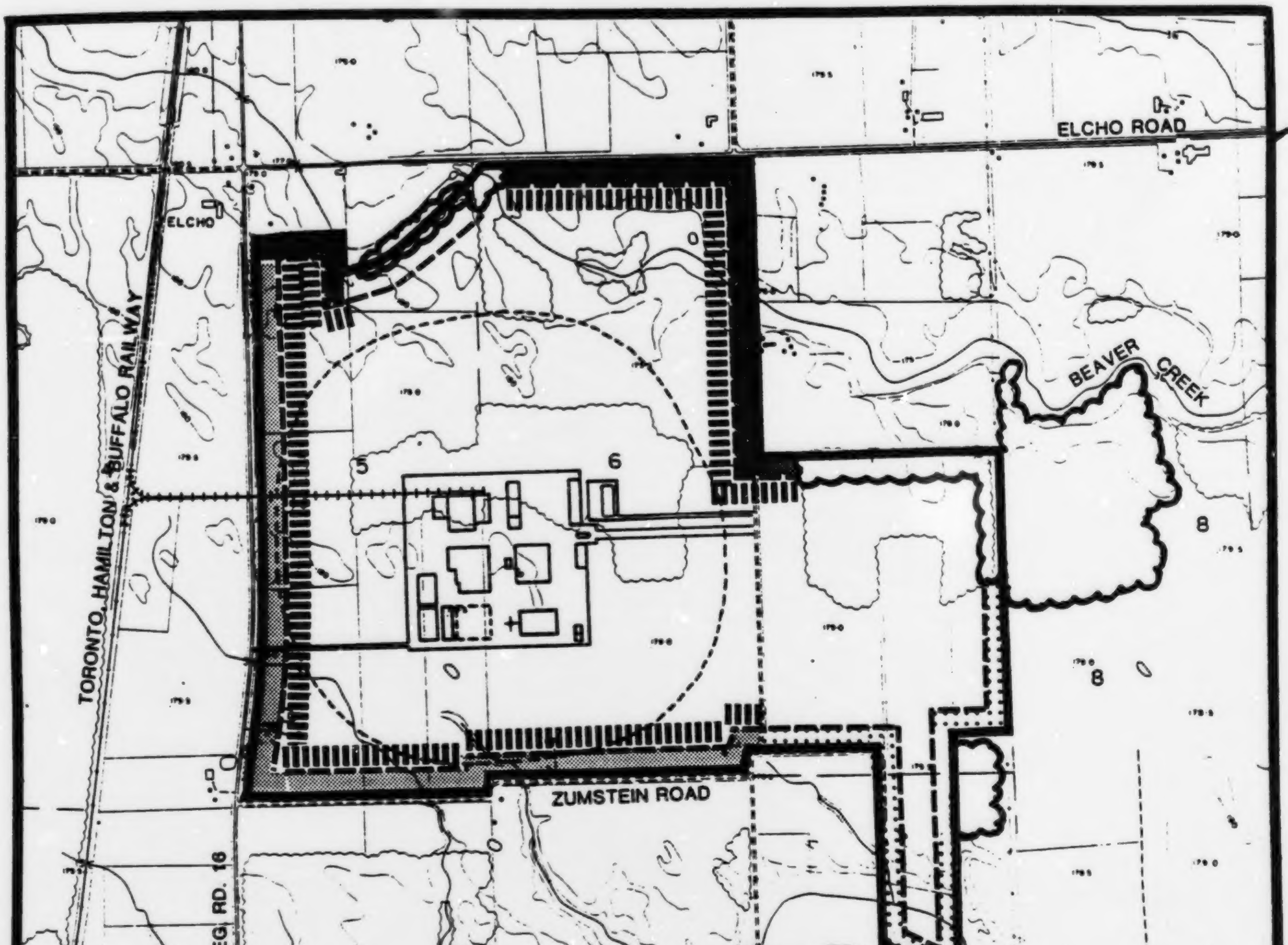

ELCHO ROAD
ELCHO
TORONTO, HAMILTON & BUFFALO RAILWAY
BEAVER CREEK
5
6
8
8
ZUMSTEIN ROAD
REG. RD. 16
KRICK ROAD
CANBOROUGH ROAD

Figure 60 Proposed Mitigation Priority Zones

LF-9C
case 1

Legend

■ High Priority Zone

▨ Priority Zone

░ Low Priority Zone

▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale
1:15000

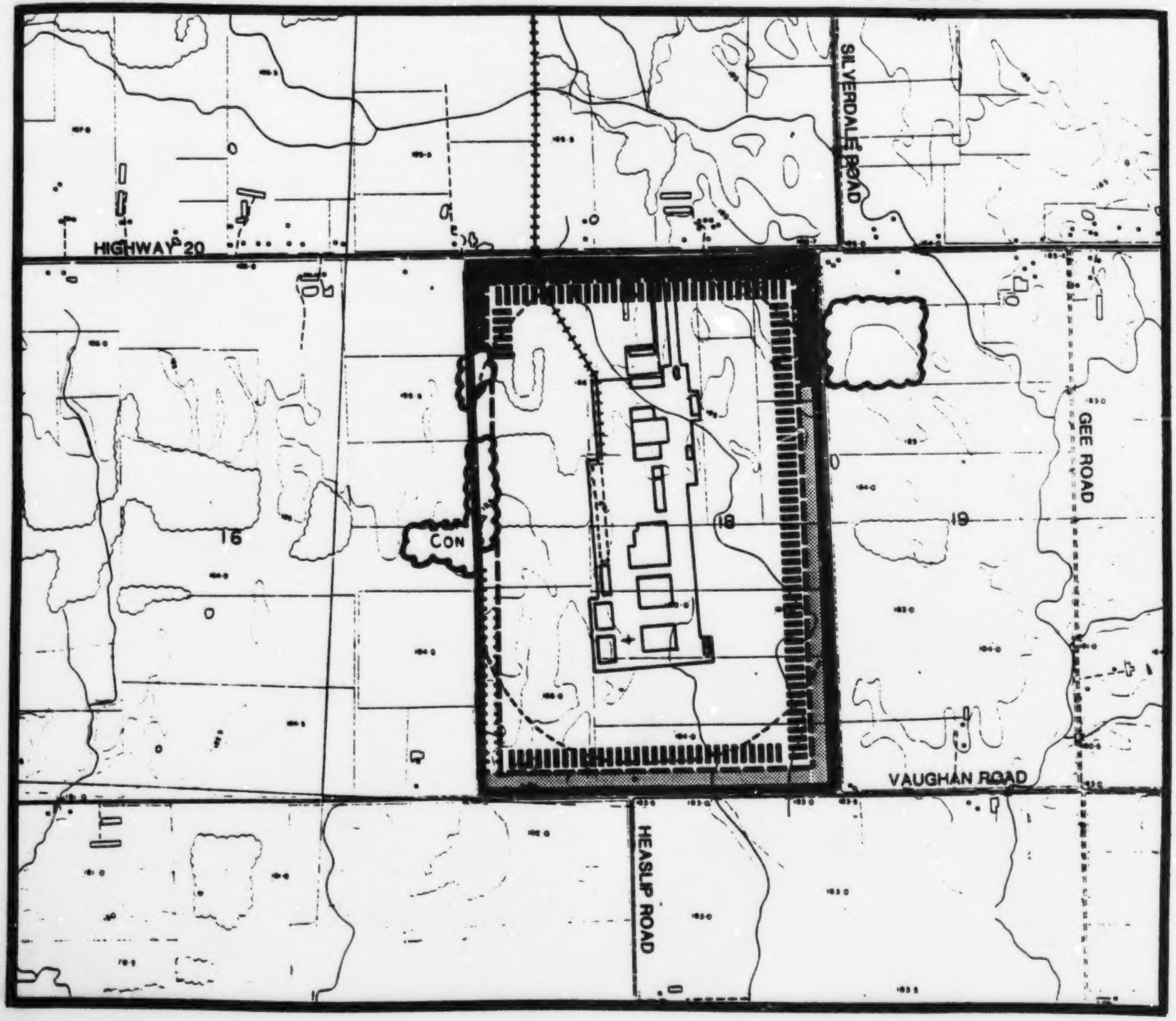

↑
SILVERDALE ROAD
HIGHWAY 20
GEE ROAD
CON
16
18
19
VAUGHAN ROAD
HEASLIP ROAD

Figure 61 Proposed Mitigation Priority Zones

LF-1E
case 1

Legend

■ High Priority Zone

▨ Priority Zone

⁘ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale ↑
1:15000

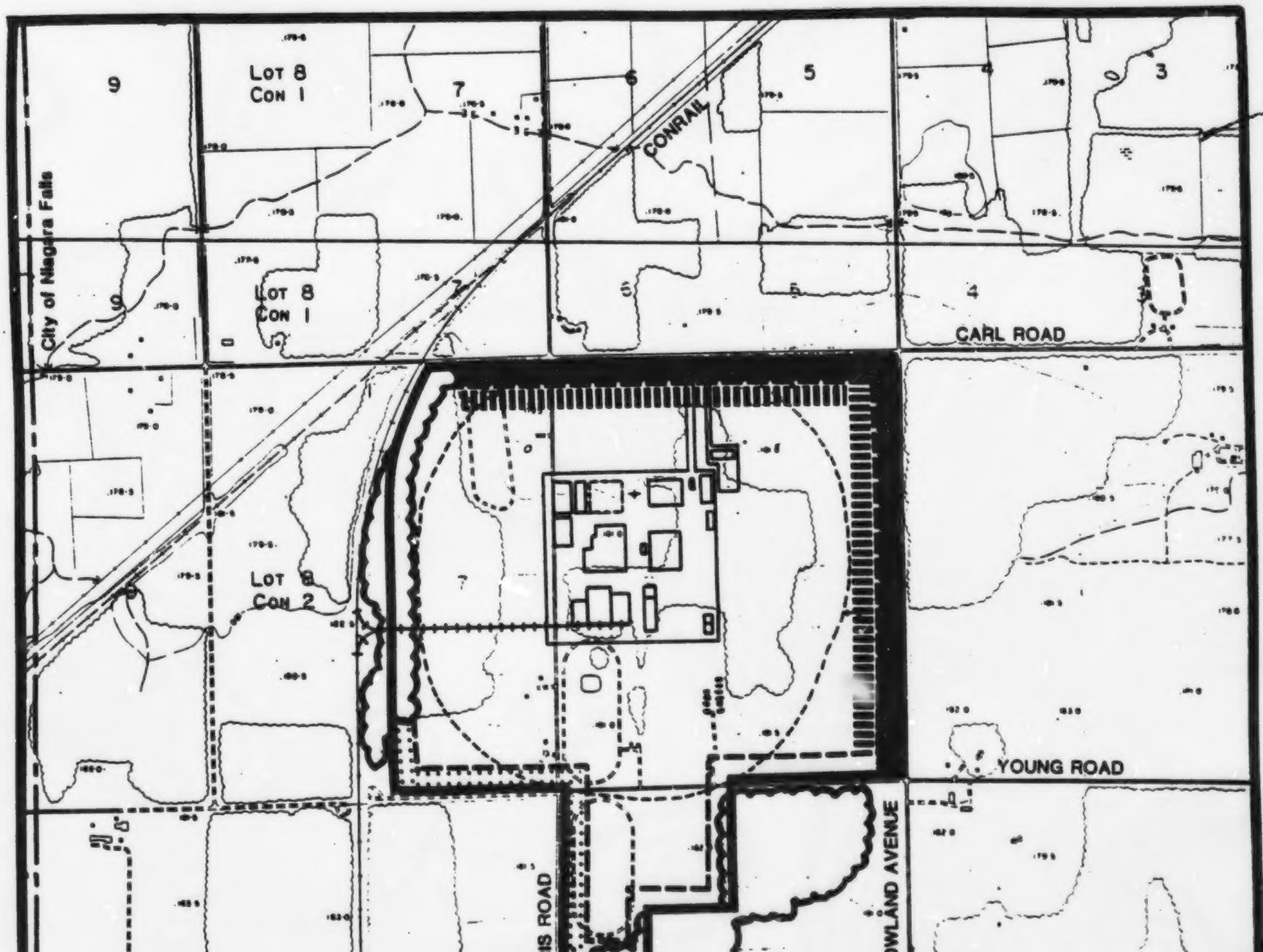

9
Lot 8
Con 1
7
6
5
3
CONRAIL
City of Niagara Falls
9
Lot 8
Con 1
5
5
4
CARL ROAD
Lot 8
Con 2
7
YOUNG ROAD
MORRIS ROAD
CROWLAND AVENUE
9
Lot 8
Con 3

Figure 62 Proposed Mitigation Priority Zones

LF-1E
case 2

Legend

■ High Priority Zone

▨ Priority Zone

⁙ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale
1:15000

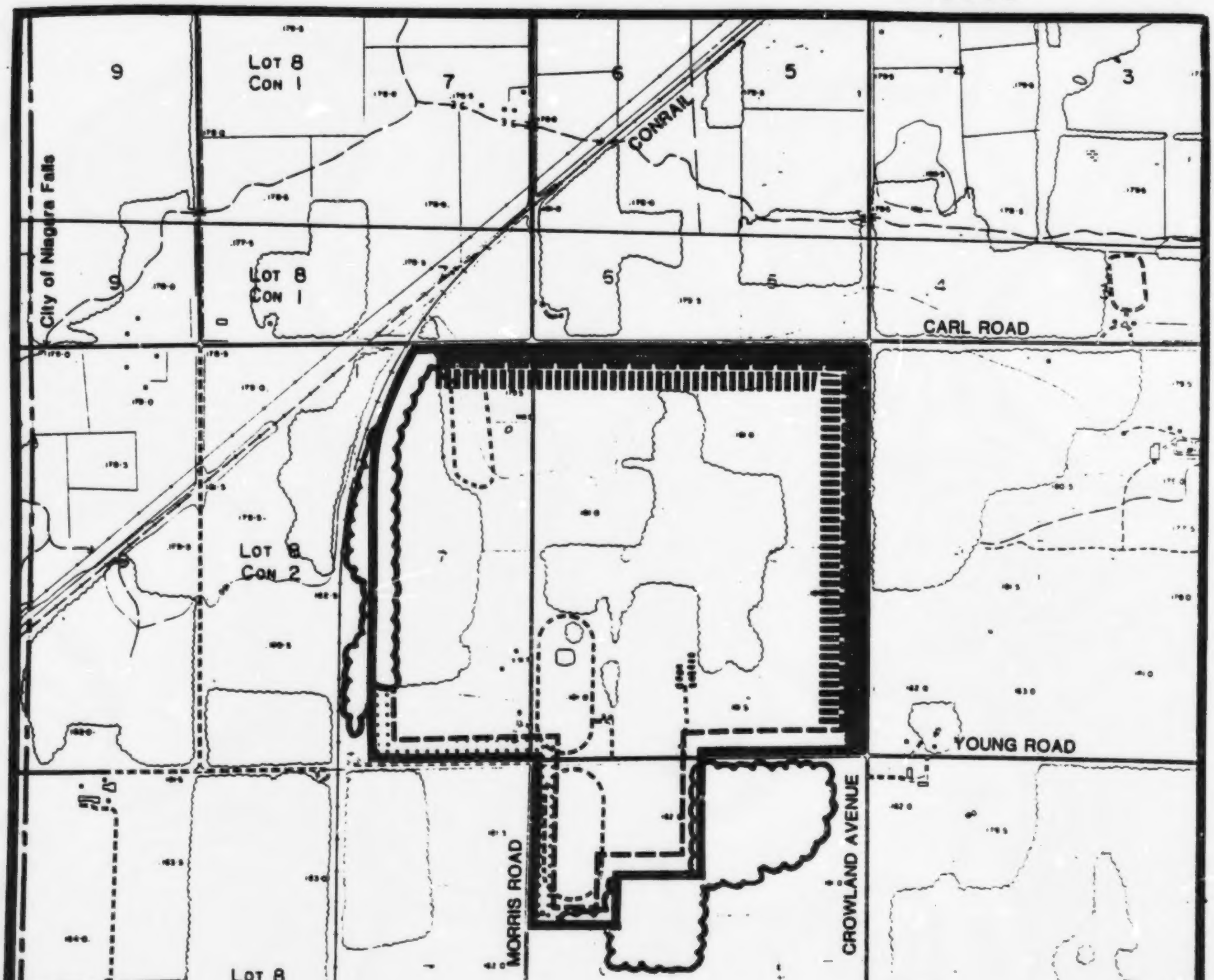

9
LOT 8
CON 1
7
6
5
4
3
CONRAIL
City of Niagara Falls
9
LOT 8
CON 1
5
5
4
CARL ROAD
7
LOT 8
CON 2
YOUNG ROAD
MORRIS ROAD
CROWLAND AVENUE
9
LOT 8
CON 3

Figure 63 Proposed Mitigation Priority Zones

LF-1E
case 3

Legend

- ■ High Priority Zone
- ▨ Priority Zone
- ⁘ Low Priority Zone
- ▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation
- — Potential Aquisition Boundary

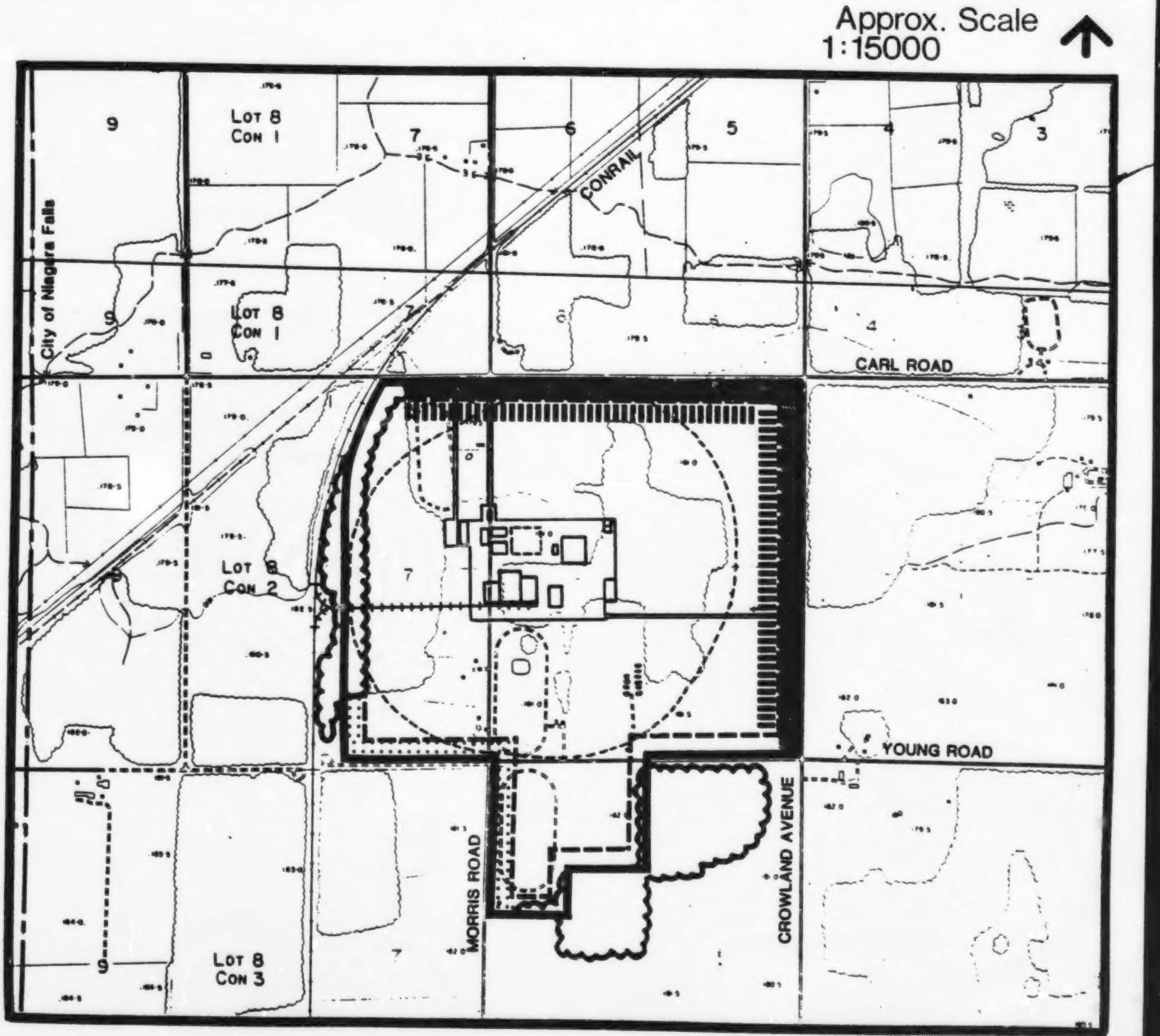

Approx. Scale
1:15000
9
Lot 8
Con 1
7
6
CONRAIL
5
4
3
City of Niagara Falls
9
Lot 8
Con 1
4
CARL ROAD
Lot 8
Con 2
7
YOUNG ROAD
MORRIS ROAD
CROWLAND AVENUE
9
Lot 8
Con 3
7

Figure 64 Proposed Mitigation Priority Zones

PI-27E
case 2

Legend

■ High Priority Zone

▨ Priority Zone

⁙ Low Priority Zone

▮▮▮▮▮▮▮ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale 1:15000 ↑

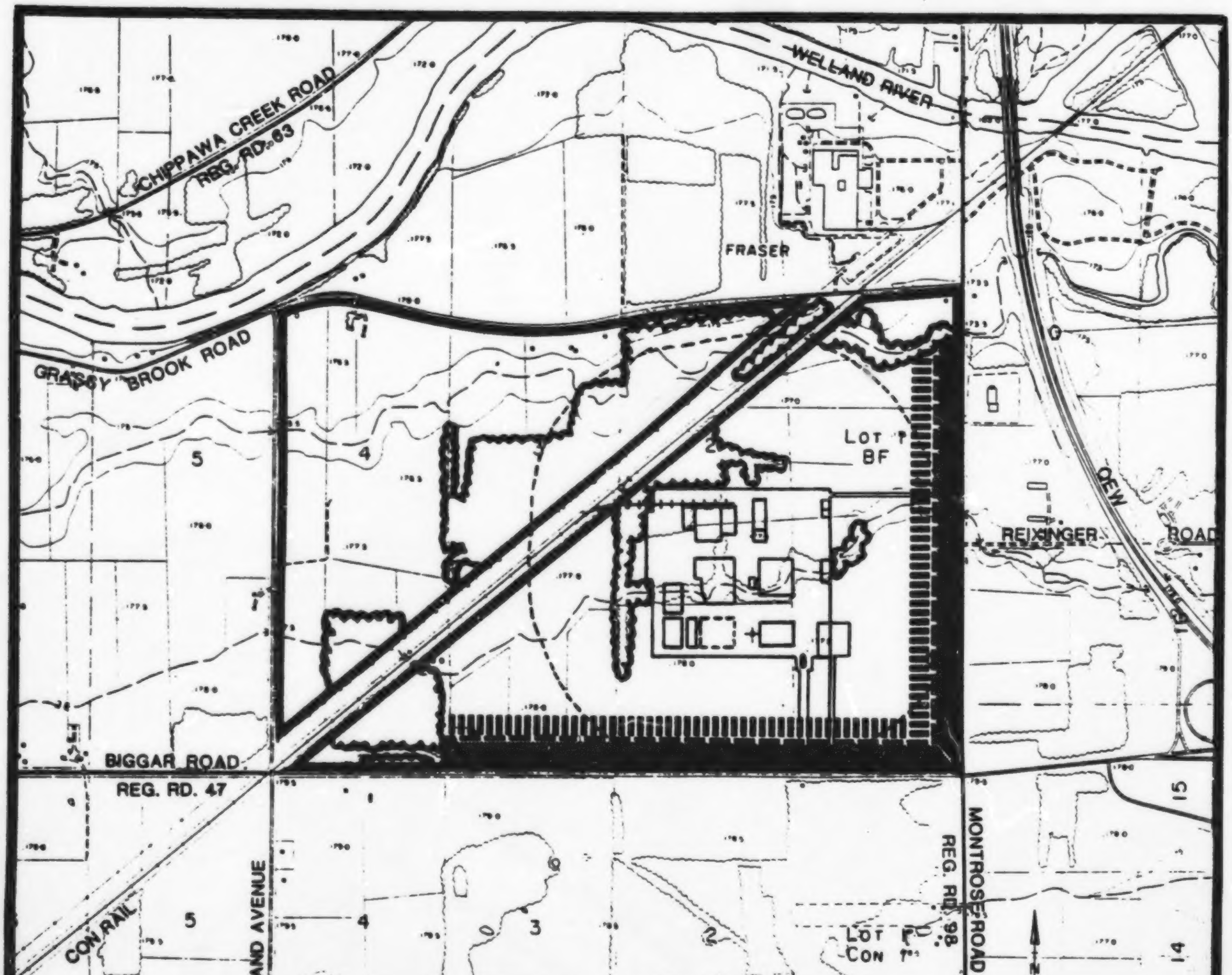

CHIPPAWA CREEK ROAD
REG. RD. 63
WELLAND RIVER
FRASER
GRASSY BROOK ROAD
5
4
2
LOT
BF
QEW
REIXINGER ROAD
BIGGAR ROAD
REG. RD. 47
CON RAIL
CROWLAND AVENUE
5
4
3
2
LOT
CON
REG. RD. 98
MONTROSE ROAD
15
14
13
7

Figure 65 Proposed Mitigation Priority Zones

PI-27E
case 3

Legend

■ High Priority Zone

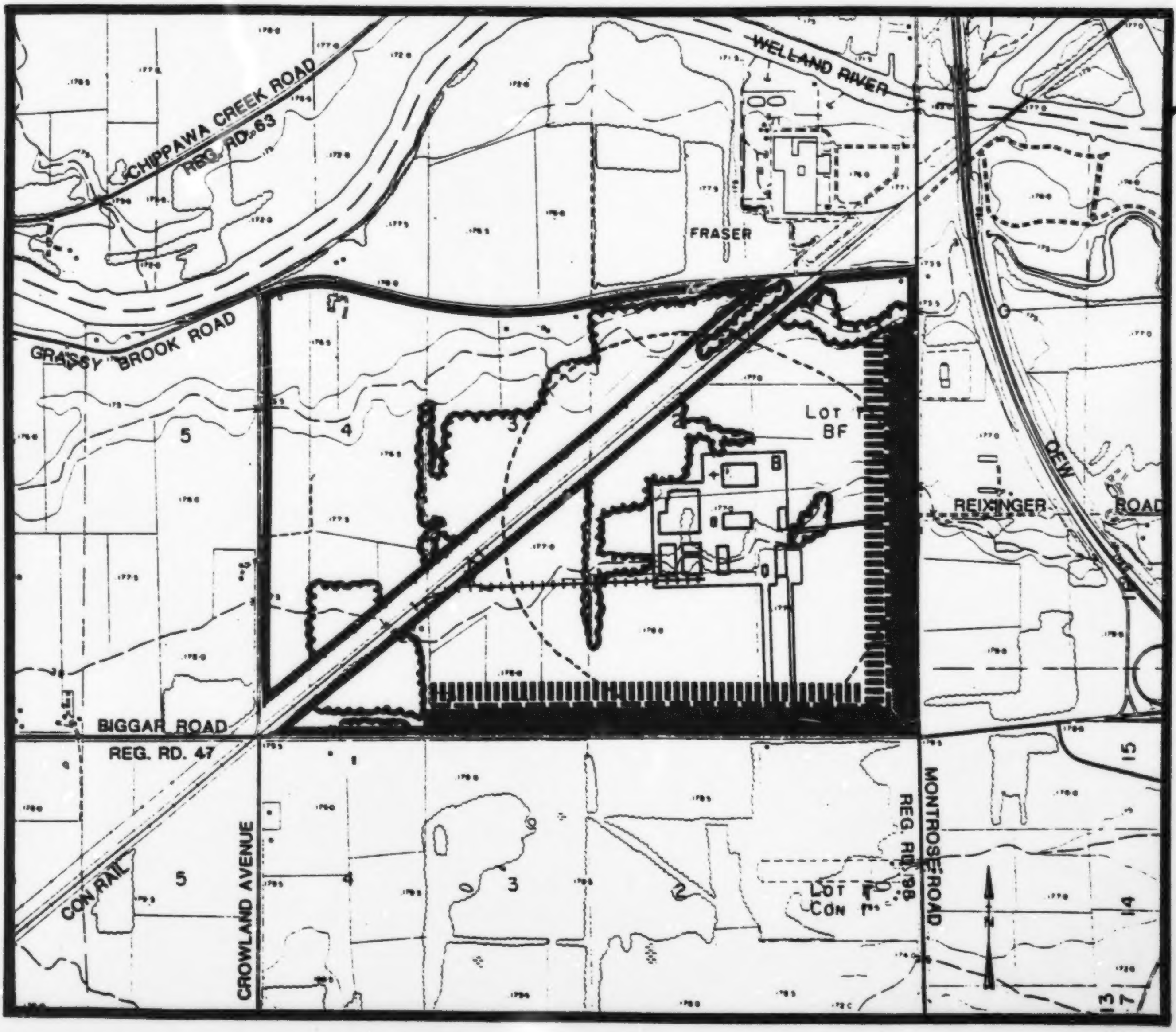
▨ Priority Zone

⁙ Low Priority Zone

▥ Length of Priority Zone Boundary Requiring Mitigation

— Potential Aquisition Boundary

Approx. Scale
1:15000


CHIPPAWA CREEK ROAD
REG. RD. 63
WELLAND RIVER
FRASER
GRASSY BROOK ROAD
5
4
3
LOT BF
REIXINGER ROAD
DEW
BIGGAR ROAD
REG. RD. 47
CROWLAND AVENUE
CON RAIL
5
4
3
2
LOT
CON
REG. RD. 98
MONTROSE ROAD
15
14
13

SUMMARY OF FINDINGS

The analyses carried out for this study identified the visual impacts and related findings for the siting options under consideration.

These findings are summarized below by siting option:

LF-4N/PI-1N

Special Visual Exposure

- site LF-4N is visible 3.8 km. (middleground) from Rattlesnake Point and 4.8 km. (middleground) from Mount Nemo
- site PI-1N is visible 6.5 km. (background) from Rattlesnake Point and 6.7 km. (background) from Mount Nemo
- both sites are within the primary scope of view from these designated viewing locations
- images of other urban development are also visible from these points, but at greater distance
- visual screening of these facilities would not be effective from these viewing points
- location of the phys/chem plant and landfill (Case 3) on LF-4N would have greater visual impact than the landfill (Case 2) alone on this site.

Visual Absorption Potential

- 1200 m. (12% of total) of major tree mass along its site boundary and off site which potentially would act as visual screening

Visual Compatibility

- surrounding land uses are predominantly rural agricultural and rural residential
- facilities would be visible from the Niagara Escarpment
- major industrial facilities would not be visually compatible due to their much larger mass and scale in this landscape and no similar features within view

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 97,400 vehicles per day would potentially be exposed to the facilities on the sites involved in this option

Intrusion on Households (Resident Viewer)

- 43 households would potentially be exposed to foreground views of the proposed facilities

- 131 households (minimum) would potentially be exposed to middleground views of the proposed facilities

Mitigative Recommendations

- Case 2 has 6,650 m. of combined boundary requiring mitigative treatments

- Case 3 has 7,750 m. of combined boundary requiring mitigative treatments

Mitigative Priorities and Cost Factor

- Case 2 has 3,350 m. of high priority boundary and 3,300 m. of medium priority boundary requiring mitigation

- Case 3 has 4,250 m. of high priority boundary and 3,300 m. of medium priority boundary

LF-4N/PI-13N

Special Visual Exposure

- site LF-4N is visible 3.8 km. (middleground) from Rattlesnake Point and 4.8 km. (middleground) from Mount Nemo on the Niagara Escarpment

- site PI-13N is visible 11.5 km. (far background) from Rattlesnake Point and 12.5 km. (far background) from Mount Nemo

- both sites are within the primary scope of view from these designated viewing locations, though PI-13N is so far in the distance that it would pose less significant exposure than PI-1N

- visual screening of these facilities would not be effective from these viewing points

- location of the phys/chem plant and landfill (Case 3) on LF-4N would have greater impact than the landfill (Case 2) alone on this site

Visual Absorption Potential

- 650 m. (6% of total) of major tree mass along the site boundaries for Case 2

- 775 m. (8% of total) of major tree mass along the site boundaries for Case 3

Visual Compatibility

- surrounding land uses are predominantly rural agricultural and rural residential
- facilities would be visible from Niagara Escarpment
- major industrial facilities would not be visually compatible due to their much larger mass and scale in this landscape

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 136,800 vehicles per day would potentially be exposed to the facilities on the sites in this option

Intrusion on Households (Resident Viewer)

- 54 households would potentially be exposed to foreground views of the proposed facilities
- 123 households (minimum) would potentially be exposed to middleground views of the proposed facilities

Mitigative Recommendations

- Case 2 has 6,700 m. of combined boundary requiring mitigative treatments
- Case 3 has 7,750 m. of combined boundary requiring mitigative treatments

Mitigative Priorities and Cost Factor

- Case 2 has 3,350 m. of high priority boundary and 3,350 m. of medium priority boundary
- Case 3 has 4,250 m. of high priority boundary and 3,300 m. of medium priority boundary
- high relative costs for mitigation

LF-3C

Special Visual Exposure

- not visible from any designated viewing location

Visual Compatibility

- surrounding land uses are predominantly rural agricultural and rural residential

- major industrial facilities would not be visually compatible due to their massive scale in this landscape and no similar features within view

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 660 vehicles per day would potentially be exposed to the facility on this site

Intrusion on Surrounding Households (Resident Viewer)

- 16 households would potentially be exposed to foreground views of the proposed facility
- 42 households (minimum) would potentially be exposed to middleground views of the proposed facility

Mitigative Recommendations

- 4,125 m. of boundary requiring mitigative treatments

Mitigative Priorities and Cost Factor

- 1,625 m. of high priority boundary and 2,500 m. of medium priority boundary requiring treatment
- medium relative levels of costs for mitigation

LF-9C

Special Visual Exposure

- not visible from any designated viewing location

Visual Absorption Potential

- 650 m. (14% of total) of major tree mass along site boundary which would potentially act as visual screening

Visual Compatibility

- surrounding land uses are predominantly rural agricultural and rural residential
- major industrial facilities would not be visually compatible due to their massive scale in this landscape and no similar features within view

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 8,500 vehicles per day would potentially be exposed to the facility on this site

Intrusion on Surrounding Households (Resident Viewer)

- 28 households would potentially be exposed to foreground views of the proposed facility
- 48 households (minimum) would be potentially exposed to middleground views of the proposed facility

Mitigative Recommendations

- 3,325 m. of boundary requiring mitigative treatments

Mitigative Priorities and Cost Factor

- 1,450 m. of high priority boundary and 1900 m. of medium priority boundary requiring treatment
- low relative levels of costs for mitigation

LF-1E

Special Visual Exposure

- visible 8.6 km. (background) from the Minolta Tower and 9.3 km. (background) from the Skylon Tower
- not within primary scope of view
- other heavy industrial and commercial images also visible from viewing points

Visual Absorption Potential

- 2,500 m. (48% of total) of major tree mass along site boundary which would potentially act as screening

Visual Compatibility

- surrounding land uses rural agricultural and rural residential with some existing and possible future industrial uses within the viewshed
- major industrial facilities would be somewhat visually compatible with the existing industrial uses

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 26,900 vehicles per day would potentially be exposed to the facility on this site

Intrusion on Surrounding Households (Resident Viewer)

- 11 households would potentially be exposed to foreground views of the proposed facility
- 35 households (minimum) would potentially be exposed to middleground views of the facility

Mitigative Recommendations

- 2,050 m. of boundary requiring mitigative treatments

Mitigative Priorities and Cost Factor

- 2,050 m. of high priority boundary
- low relative levels of costs for mitigation

LF-1E/PI-27E

Special Visual Exposure

- site LF-1E is visible 8.6 km. (background) from the Minolta Tower and 9.3 km. (background) from the Skylon Tower
- site PI-27E is visible 6.3 km. (background) from the Minolta Tower and 7.0 km. (background) from the Skylon Tower

Visual Absorption Potential

- 5,525 m. (51% of total) of major tree mass along boundaries for cases 2 and 3

Visual Compatibility

- surrounding land uses are predominantly rural agricultural and rural residential with other heavy industry nearby and within the viewshed
- facilities would be visible from Niagara Falls towers
- major industrial facilities would be partially visually compatible in this landscape

Intrusion on Passing Traffic (Dynamic Viewer)

- a total of 45,600 vehicles per day would potentially be exposed to the facilities on these sites

Intrusion on Surrounding Households (Resident Viewer)

- 15 households would potentially be exposed to foreground views of the proposed facility for both Cases 2 and 3
- 37 households (minimum) would potentially be exposed to middleground views of the proposed facilities

Mitigative Recommendations

- Cases 2 and 3 each have 4,300 m. of boundary requiring mitigation treatments

Mitigative Priorities and Cost Factor

- Cases 2 and 3 have 4,300 m. of high priority boundary
- medium relative costs for mitigation

SENSITIVITY ANALYSIS

In addition to the above analysis for the proposed facility on the eight candidate siting options, an additional facility option was identified part way through the assessment. This additional option involved partial solidification at the physical/chemical plant. The most significant implication for the visual analysis would be the addition of a 45 metre stack and evaporation plume added to the physical/chemical component.

This would result in a second stack on the Case 1 and Case 2 siting options, and a new stack on the Case 3 phys/chem plant/landfill site. The plume is understood to consist primarily of water vapour. It is expected that this plume would be clear in warmer temperatures and visible while in cold temperatures due to condensation.

No detailed analyses were undertaken of this aspect, but it is estimated that there would be no major implications on the analysis to effect the ranking of siting options.

SECTION D

COMPARATIVE EVALUATION OF SITING OPTIONS

INTRODUCTION

This section of the report assembles the findings of the previous analyses in order to facilitate comparison and overall ranking.

COMPARISON OF FINDINGS

The types of analyses carried out for this assessment can only be compared from siting option to siting option. They do not interrelate from analysis to analysis. That is, the results from the impact on households, for example, provide data to rank the siting options based on the number of households exposed to views of the facility. For this reason, the results of each analysis were used to rank the siting options for only that analysis.

Siting options which ranked number 1 were identified as being preferred. Those siting options numbered from there on would be arranged in descending order of preference.

OVERALL RANKING OF SITING OPTIONS

The ranking of siting options was accomplished through the addition of individual numerical ranks from the analyses. The siting option with the lowest overall score would therefore be identified as the preferred option. Siting options which had the same rank were each credited with that rank. Greater weight is inherently given to impacts on local residents and the adjacent area as opposed to the regional and nonresident impacts since there are more indicators for this factor grouping. Table 16 summarizes the numerical rankings from the analyses. This table does not include any ranking or weighting of indicators.

TABLE 16 - SUMMARY OF VISUAL IMPACT ASSESSMENT RANKING

		PRE-MITIGATION						MITIGATION IMPLICATIONS		
		Impacts on Environs and Local Residents			Impacts on Region and Non-Residents			Reduction in Impacts		
Siting Option	Case	Visual Absorption Potential	Visual Compatibility	Intrustion on Residents	Special Visual Exposure	Intrusion on Passing Traffic	Overall Score	Mitigation Recommendations	Mitigation Priorities	Overall Score
LF-1E	1	2	1	1	2	3	9	1	1	11
LF-3C	1	3	3	3	1	1	11	3	3	17
LF-9C	1	4	4	4	1	2	15	2	2	19
LF-1E &PI-27E	2	1	2	2	3	4	12	4	4	20
LF-1E &PI-27E	3	1	2	2	3	4	12	4	4	20
LF-4N &PI-27E	2	6	5	7	6	6	30	5	5	40
LF-4N &PI-1N	3	5	5	7	6	6	29	7	7	3
LF-4N &PI-13N	2	8	6	8	5	5	32	6	6	44
LF-4N &PI-13N	3	7	6	8	5	5	31	7	7	45

The composite rankings for the pre-mitigation analysis are therefore identified in descending order of preference:

	Rank	Siting Option	Case
Most Preferred	1	LF-1E	1
	2	LF-3C	1
	3	LF-1E and PI-27E	2 and 3
	4	LF-9C	1
	5	LF-4N and PI-1N	3
	6	LF-4N and PI-1N	2
	7	LF-4N and PI-13N	3
Least Preferred	8	LF-4N and PI-13N	2

The composite rankings for the siting options, when mitigative measures are taken into account, result in the following ranking:

	Rank	Siting Option	Case
Most Preferred	1	LF-1E	1
	2	LF-3C	1
	3	LF-9C	1
	4	LF-1E and PI-27E	2 and 3
	5	LF-4N and PI-1N	2
	6	LF-4N and PI-1N	3
	7	LF-4N and PI-13N	2
Least Preferred	8	LF-4N and PI-13N	3

RECOMMENDATIONS

The findings of this assessment have identified four siting options which are clearly preferable from a visual impact standpoint. These are listed below, in order of preference:

1. LF-1E (case 1)
2. LF-3C (case 1)
3. LF-9C (case 1).
4. LF-1E and PI-27E (cases 2 and 3)

These siting options were found preferable for the following reasons:

- little or no exposure to special viewing locations
- large amount of existing screening that would maximize "visual absorption"
- small number of passing motorists
- minimum intrusion by local residents
- visually compatible surrounding land uses

Siting option LF-1E ranked well above the other options since it satisfied these factors best. Ranked somewhat lower, options LF-3C and LF-9C were found to have visually incompatible surrounding land uses and least existing screening. Option LF-1E/PI-27E ranked lower due to larger volumes of passing traffic and more extensive mitigation potentially required. The other partially integrated options (LF-4N and PI-1N; LF-4N and PI-13N) ranked substantially lower in all the indicators.

These rankings are based on general, overview levels of analysis geared to establish relative visual impacts. Further, more detailed study should be undertaken by OWMC focusing on the preferred site when all factors and studies in Phase 4A have been completed.

The detailed studies which should be undertaken include:

- detailed visual baseline data of the preferred site
- detailed visual data of the proposed facility
- detailed study and confirmation of the anticipated impacts
- community confirmation of visual impacts
- determine necessity and requirement for appropriate visual mitigative measures
- establish monitoring program for visual change in the landscape.

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